IBS RESEARCH REPORT 01/2026
JANUARY 2026

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IBS research report 01/2026

January 2026

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Abstract

This report assesses Poland's updated National Energy and Climate Plan (published in December 2025) by combining evidence on energy and climate security risks with new findings on public preferences for transition policies. Using the Energy and Climate Security Risk Index (ECSRI), we benchmark four risk dimensions – geopolitical, affordability, reliability, and sustainability – against the NECP's targets and measures. We complement the policy review with a survey and a discrete choice experiment that reveals preferences over policy trade-offs involving climate impacts, fossil-fuel imports, and the distribution of transition costs and benefits. The findings indicate that the main point of contention is no longer target ambition alone, but the trajectory, feasibility, and durability of delivery. Affordability is the most sensitive area, and policy acceptance depends on cost resilience and perceived fairness. Meeting the NECP commitments will require coherent governance and strong implementation capacity, underpinned by cost resilience and social legitimacy. The findings also call for a broader understanding of energy–climate security that captures households' exposure to price-volatility risk and helps explain public attitudes towards energy and climate policies.

Keywords: NECP, energy security, energy affordability, social acceptance, energy transition, Poland

JEL: Q48, Q58, H23, D78, C93

This report is based on data developed within the project Fostering ambitious and effective NECPs in Central and Eastern Europe. The project is funded by the European Climate Protection Initiative (EUKI) and co-financed by the Polish Ministry of Science and Higher Education from funds for the implementation of international projects. The findings, interpretations, and conclusions expressed in this publication are those of the authors and do not necessarily reflect the views or official position of the Institute for Structural Research or any affiliated institutions. The authors thank Jan Frankowski and Aleksandra Prusak for their valuable contributions and insightful comments.

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Abbreviations

BECCS — Bioenergy with Carbon Capture and Storage
CCS — Carbon Capture and Storage
CCU — Carbon Capture and Utilization
CCUS — Carbon Capture, Utilization, and Storage
CGE — Computable General Equilibrium (model)
CO_2 — Carbon dioxide
DCE — Discrete Choice Experiment
ECSRI — Energy and Climate Security Risk Index
EED — Energy Efficiency Directive
ESR — Effort Sharing Regulation
ETS — EU Emissions Trading System
ETS2 — EU Emissions Trading System 2 (ETS "phase/extension" covering additional sectors)
FSRU — Floating Storage and Regasification Unit
GDP — Gross Domestic Product
GHG — Greenhouse Gas(es)
JTF — Just Transition Fund
LIHC — Low-Income High-Cost (indicator/definition used in energy poverty work)
LNG — Liquefied Natural Gas
LPG — Liquefied Petroleum Gas
LULUCF — Land Use, Land-Use Change and Forestry
NECP — National Energy and Climate Plan
PPS — Purchasing Power Standard
RED — Renewable Energy Directive
RES — Renewable Energy Sources
SME — Small and Medium-sized Enterprise(s)
WAM — With Additional Measures (scenario)
WEM — With Existing Measures (scenario)
WTP — Willingness to Pay

Executive Summary

This country report evaluates Poland's updated National Energy and Climate Plan (Ministry of Energy, 2025) using a mixed-methods framework that integrates two complementary analytical lenses: (1) the Energy and Climate Security Risk Index (ECSRI) developed by the Center for the Study of Democracy, which benchmarks national exposure across four risk dimensions, and (2) evidence on social preferences and public acceptance of transition pathways. The analysis combines desk-based research drawing on official materials (including documents provided by the Ministry of Climate and Environment), stakeholder positions and reports, and insights from stakeholder dialogue during the NECP consultation process, with primary survey evidence incorporating a discrete choice experiment (DCE) to elicit preferences over key policy trade-offs.

Poland's energy and climate security risk profile (ECSRI)

The ECSRI, applied for the years 2008–2023, identifies four key risk dimensions for Poland – each carrying distinct vulnerabilities and policy implications.

- Geopolitical risk has historically been Poland's most acute vulnerability due to dependence on Russian fossil fuels. The decisive diversification of gas and coal imports since 2022 has significantly reduced exposure to geopolitical pressures. While import dependency remains high, structural diversification has transformed Poland's risk profile, positioning the country more favorably against external shocks.
- Affordability risk remains the most pressing challenge. Poland's continued reliance on coal and other fossil fuels exposes households and businesses to volatile prices and high CO_2 costs, driving persistent energy poverty. Temporary government interventions mitigated short-term impacts, but sustained improvements will require structural measures: energy efficiency upgrades, faster deployment of renewables, and targeted protection of vulnerable households.
- Reliability risk has declined due to diversification and renewable growth, but continued coal dependence, alongside ageing and capacity-constrained infrastructure, still limits flexibility. Long-term resilience will depend on accelerating investment in low-carbon technologies, system flexibility, and integration with EU energy markets. Nuclear power is expected to play a future stabilizing role, but interim progress hinges on renewables and efficiency.
- Sustainability risk remains high due to slow progress in decarbonization, limited gains in resource productivity, and weak implementation of circular economy practices. Achieving sustainability will require large-scale investments in low-carbon energy, including renewables and nuclear power, coupled with systemic improvements in efficiency, recycling, and circular economy adoption.

Overall, Poland has strengthened its position against geopolitical shocks, but the transition must urgently address affordability pressures, while accelerating reforms to enhance system reliability. While diversification efforts and investments in renewables have reduced some risks, the system remains constrained by several interlinked challenges:

- Fossil fuels reliance. Poland's energy mix remains coal-intensive, with domestic coal continuing to play a dominant role in power and heat. At the same time, import dependence is concentrated in oil and natural gas (and only to a lesser extent in coal). These features sustain exposure to carbon-pricing costs, vulnerability to international price volatility and supply disruptions. While gas diversification has strengthened resilience, the pace of coal phaseout increases pressure to secure affordable and scalable low-carbon alternatives.
- Infrastructure bottlenecks. Expansion of renewables is outpacing grid, storage, and demand management capacity. Without substantial investment, system flexibility and reliability will remain limited.
- Residential inefficiencies. A large share of housing is energy-inefficient, with widespread use of coal-based heating. This drives high household costs and locks in environmental and security risks.

- Energy poverty. Many households face vulnerability to price shocks and policy-driven cost increases, deepening social inequalities unless stronger protections are introduced.
- Policy coordination. Fragmented governance and uneven regional impacts complicate the transition. Effective coordination and stable financing, including EU support, are critical to sustaining reforms.

NECP framework, targets, and challenges

The 2025 National Energy and Climate Plan (NECP) sets out an integrated framework for Poland's energy transition, combining decarbonisation measures with energy security considerations and social safeguards. The revised NECP emphasises policy interlinkages across the five dimensions of the EU Energy Union and frames implementation as a cross-sectoral process. The analytical baseline is structured around two policy scenarios: WEM (With Existing Measures), which reflects outcomes under currently implemented policies and measures, and WAM (With Additional Measures), which incorporates the additional instruments and investments envisaged in the NECP to achieve the stated targets.

Effective delivery requires that the NECP serve as the overarching reference for sectoral strategies and plans, underpinned by a clearly defined hierarchy of policy documents and aligned assumptions, targets, and timelines. Implementation monitoring should extend beyond emissions indicators to include affordability and reliability metrics and a limited set of cross-cutting milestones (e.g., grid reinforcement and connections, building renovation, and district-heating upgrades). On this basis, the NECP sets out the following key targets:

- Greenhouse gas emissions are projected to decrease by 54% by 2030 and 76% by 2040 relative to 1990 levels. The transition is expected to be driven primarily by the expansion of renewable energy, with the share of renewables in gross final energy consumption projected to reach 32% by 2030 and over 60% by 2040. The share of coal in electricity generation is expected to decline to approximately 21% by 2030, while nuclear power and hydrogen are projected to play an increasingly significant role after 2035.
- Energy efficiency first serves as a guiding principle of the updated NECP. Under the WAM scenario, primary energy consumption is projected to fall by 14.7% and final energy consumption by 4.6% by 2030 compared with 2020 levels. Deep thermal modernization, digitalization, and the deployment of smart control systems will be prioritized across the residential, industrial, and public sectors.
- Energy independence and security remain a central dimension of Poland's transition strategy. Diversification of gas and oil supply routes, combined with grid modernization and the gradual introduction of nuclear energy, is expected to improve system reliability and resilience. Strengthened cross-border interconnections will facilitate renewable energy integration and enhance the stability of electricity and gas supply across Central and Eastern Europe.
- Innovation and research are positioned as key enablers of Poland's energy transition. The NECP sets a target of increasing R&D expenditure to 2.5% of GDP by 2030, strengthening the national capacity for technological development and industrial competitiveness. Priority areas include hydrogen technologies, energy storage, digitalization, and energy efficiency solutions, supported by coordinated EU and national funding mechanisms to accelerate the deployment of clean and low-carbon technologies.

At the same time, the integrated assessment highlights three critical "delivery and durability" challenges:

- Affordability and household resilience are the largest gap between diagnosed risk and policy readiness. The NECP moves in the right direction (coal exit in heating, support architecture, linkage to EU instruments), but instruments to reduce household cost risk remain fragmented and insufficiently integrated into a single, coherent framework combining efficiency investment, market design and durable social protection.
- Energy efficiency is declared as a guiding principle, yet projected outcomes (notably for final energy consumption) fall well below the ambition level required by the EU trajectory – implying higher demand, higher system costs, and greater exposure to fuel and CO_2 price volatility.

- Transport transformation and circular economy integration remain weaker points. Transport is both a decarbonization and security issue (imported oil dependence), yet the NECP acknowledges difficulty meeting 2030 transport RES goals. In sustainability, the NECP strengthens climate ambition, but circular economy policies remain marginal relative to the risk diagnosis (material intensity and low circularity).

Social acceptance: strong potential support, conditional on costs, fairness and trust

The acceptance of transition pathways will depend not only on technological and financial factors but also on social trust, perceptions of risk, and views on what constitutes a fair distribution of costs and benefits. The findings of this study indicate that there is considerable potential for public support of ambitious climate and energy policies in Poland. This support is more likely when policies are designed and communicated in ways that address concerns about security, fairness, and shared benefits. Three implications stand out:

- Public expectations center primarily on security and stability. Policies that simultaneously reduce emissions, mitigate climate impacts, and decrease dependence on imported fossil fuels are the most likely to gain broad social endorsement. When designing instruments such as renewable-energy support schemes, grid modernization, or energy-efficiency programs, it is therefore essential to communicate not only their mitigation potential but also their contribution to energy security and system resilience.
- The public accepts a moderately progressive distribution of transition costs, in which higher-income households bear a proportionally greater share, yet there is resistance to narratives that place the entire burden on a narrow group. Financial mechanisms should thus incorporate progressive elements while maintaining broad participation and avoiding highly selective burden-sharing. Similarly, policies that concentrate benefits exclusively on one social group have limited potential for wider support. Targeted assistance for vulnerable households is most effective when embedded within a universal framework that delivers visible benefits to the majority of citizens.
- Respondents expect domestic institutions — central government, local authorities, and energy companies to assume a more proactive role. Communication should therefore avoid framing climate policy as merely a response to external obligations. Emphasizing how national decisions align with the European framework and bring tangible local benefits can strengthen the perception of the transition as a shared national project rather than an externally imposed agenda.

Key messages for implementation

The assessment of Poland's NECP through the lens of transition risks and social preferences indicates that the main point of contention is no longer target ambition alone, but the trajectory, feasibility, and durability of delivery. This requires managing three dimensions in parallel: (1) strategic coherence and delivery capacity, (2) cost resilience and social legitimacy, and (3) energy and climate security understood more broadly than supply alone—namely the ability of the energy system and households to withstand price volatility, geopolitical disruptions, and the growing variability of power generation.

The findings identify affordability as the most sensitive area. Not only the level of costs, but also how they are distributed, is likely to determine public acceptance and, in turn, the pace of implementation. At the same time, maintaining system reliability up to 2035 requires treating the scale-up of renewables, energy efficiency, and flexibility as one integrated package. Delays in grids, storage, and demand-side solutions risk postponing the benefits of the transition and increasing pressure for ad hoc price interventions.

The assessment of Poland's updated NECP through the lens of transition risks and social preferences suggests that the main challenge is no longer target ambition alone, but the trajectory, feasibility, and durability of delivery. In practice, this means managing three dimensions in parallel: (1) strategic coherence and delivery capacity, (2) cost resilience and social legitimacy, and (3) a broader understanding of energy and climate security - i.e., the ability of the energy system and households to withstand price volatility, geopolitical disruptions, and increasing variability in power generation. Affordability is the most sensitive area: public acceptance depends not only on the level of costs but also on how they are distributed. At the same time,

maintaining system reliability through 2035 requires treating renewables, energy efficiency, and flexibility as one integrated package, because delays in grids, storage, and demand-side solutions can postpone benefits and increase pressure for ad hoc price interventions. Detailed implementation-oriented recommendations are presented in Section 6.

Overall, the report shows that the credibility of Poland's transition pathway will be determined not only by targets, but by delivery capacity and social durability. A coherent strategic framework, risk-aware monitoring with corrective mechanisms, and transparent, inclusive policy design can reduce exposure to price and security shocks while strengthening public trust. Such policy design will allow the NECP to function as a robust backbone for an affordable, secure, and widely supported energy and climate transition.

1. Introduction

The update of Poland's National Energy and Climate Plan (NECP) comes at a moment when energy policy in Europe is shaped simultaneously by security imperatives and accelerated climate ambition. The energy price crisis, compounded by disruptions triggered by Russia's aggression against Ukraine, exposed significant vulnerabilities in European energy systems. These were most evident in affordability pressures faced by households and firms. The crisis also strengthened the strategic rationale for faster decarbonisation, diversification of supply, and reduced dependence on imported fossil fuels.

In Poland, these challenges are especially acute given the legacy of a coal-intensive energy mix, persistent structural weaknesses in the residential heating sector, and continued exposure to price volatility and carbon costs. Recent years show that 'energy security' is not just about supply and infrastructure. It also depends on household and business resilience to cost shocks, power-system flexibility as renewables grow, and institutions' capacity to deliver complex investments predictably. These considerations make the NECP update not only a compliance exercise within the EU governance framework, but a central strategic document defining the feasibility and social durability of Poland's transition pathway.

The political and institutional context of the NECP update matters for how the plan can be implemented. The preparation process combined modelling work with stakeholder engagement, including a government working group established in November 2023 and a two-stage public consultation process conducted in October–November 2024 and February 2025, generating extensive feedback across social, economic, environmental and technical dimensions. These dynamics illustrate the complexity of advancing an ambitious transition in a coal-reliant economy, where policy design must balance climate goals with affordability, regional impacts, and the credibility of delivery.

Against this background, this country report provides an assessment of Poland's updated NECP through two complementary lenses. First, we analyse Poland's energy and climate security risk profile using the Energy and Climate Security Risk Index (ECSRI), which benchmarks national exposure across four dimensions: geopolitical, affordability, reliability, and sustainability, and helps identify structural vulnerabilities and their key drivers. Second, we incorporate evidence on social preferences and public acceptance of transition pathways, recognising that the pace and durability of implementation depend not only on technical feasibility and financing, but also on perceptions of fairness, distribution of costs and benefits, and institutional trust. Although initial attempts to assess preferences in the context of energy policy have already emerged, such approaches remain rare in Poland. By adopting this lens, the report complements techno-economic evidence with the household perspective, treating households not only as end users affected by policy outcomes but also as stakeholders whose preferences shape the feasibility and social durability of the transition.

The report consists of six sections. Section 2 presents Poland's risk profile using the ECSRI framework and discusses the main drivers and vulnerabilities across the four risk dimensions. Section 3 assesses the updated NECP in detail, focusing on its analytical foundations, stakeholder engagement, targets and measures across the five dimensions of the EU Energy Union, and its approach to just transition challenges. Section 4 examines social preferences and public acceptance, including attitudes to the transition and preferences revealed through a choice experiment, and draws implications for policy design and communication. Section 5 provides an integrated assessment of the NECP, evaluating the consistency of its ambitions with the risk profile, the durability of ambition through the lens of social acceptance, and the alignment of the updated NECP with EU climate and security goals. Section 6 concludes with implementation-oriented recommendations aimed at strengthening strategic coherence, reducing key risks, and securing durable public support for Poland's energy and climate transition.

2. Energy and Climate Security Risks

2.1. Measuring energy and climate security risks

Energy security and climate resilience have in recent years emerged as two of the most pressing challenges for public policy in Europe. The energy price crisis, triggered by disruptions on global commodity markets and exacerbated by Russia's aggression against Ukraine, has highlighted the scale of risks facing EU member states. At the same time, the European Green Deal and the ongoing updates of the National Energy and Climate Plans (NECPs) are driving an ambitious transformation of national economies toward a low-carbon, more shock-resilient future. In this context, the importance of analytical tools that can systematically assess progress, benchmark policies, and identify vulnerabilities has grown substantially.

The Energy and Climate Security Risk Index (ECSRI), introduced in 2022 by the Center for the Study of Democracy (Center for the Study of Democracy CSD, 2022), benchmarks energy and climate security performance across EU Member States and helps identify structural vulnerabilities (CSD, n.d.). Beyond offering a dynamic analytical lens over time, the ECSRI integrates four dimensions—geopolitical exposure, affordability, reliability, and sustainability—within a single harmonised framework. By capturing the current conditions and longer-run trajectories, the ECSRI can support policymaking and facilitate coordination between national measures and EU-level strategy.

The index captures four core dimensions of risk:

1. Geopolitical risks – the extent of dependence on imported energy resources and exposure to geopolitical disruptions.
2. Affordability of energy consumption – the impact of energy costs on households and the competitiveness of national economies.
3. Reliability of energy supply – the ability of the energy system to provide continuous and stable supply.
4. Sustainability of production and consumption – progress in decarbonization and integration of climate goals into energy system development.

These dimensions are operationalised through 20 indicators for 2008–2023. To ensure comparability across indicators expressed in different units, each country-year value is standardised using the EU average and standard deviation in 2015 as fixed reference values:

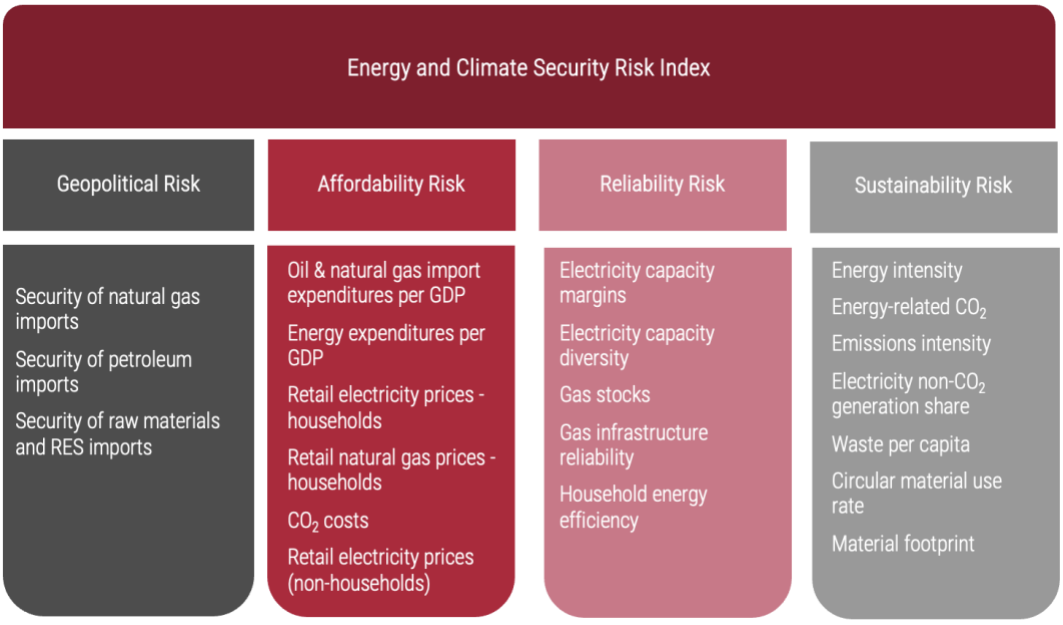
$$z_{i,c,t} = \frac{x_{i,c,t} - \mu_{i,EU,2015}}{\sigma_{i,EU,2015}}$$

where:

- $x_{i,c,t}$ is the value of indicator *i* for country *c* in year *t*;
- $\mu_{i,EU,2015}$ is the EU average of indicator *i* in 2015;
- $\sigma_{i,EU,2015}$ is the EU standard deviation of indicator *i* in 2015.

Scores are then scaled by 100, such that 0 equals the EU-2015 average, +100 corresponds to one EU-2015 standard deviation above the baseline (higher risk), and −100 to one standard deviation below. The choice of 2015 provides a consistent pre-defined baseline for tracking changes in risk levels over time and reflecting the implications of policy action. Dimension scores and the overall ECSRI are computed as geometric means of the standardised indicators, with equal weighting. This synthetic measure supports cross-country and temporal comparison while recognising the interdependence of risk drivers across dimensions.

Figure 1. Four dimensions of the Energy and Climate Security Risk Index



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

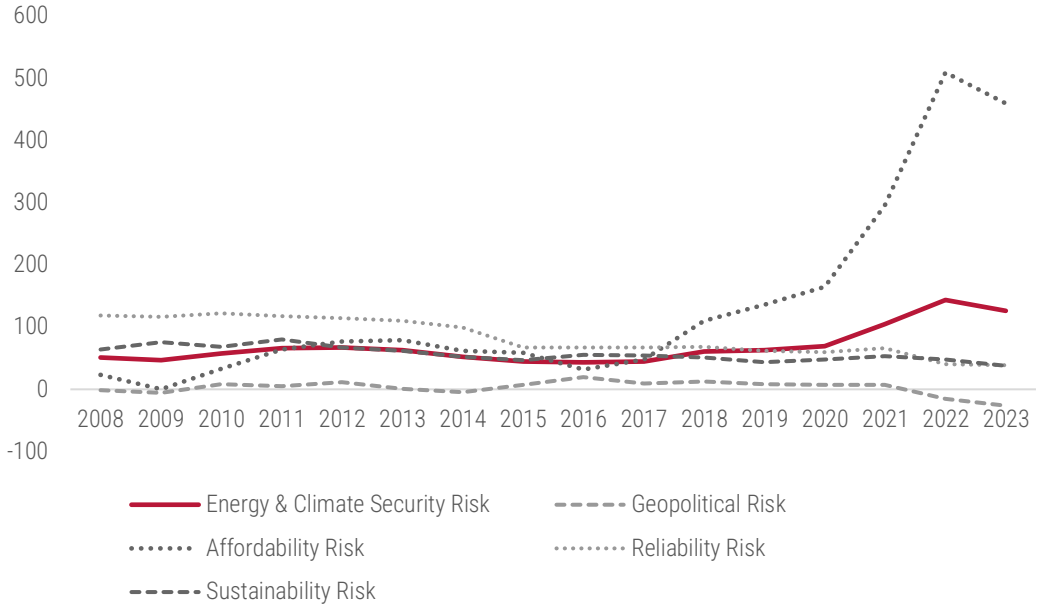
By monitoring country performance across all four risk dimensions, the ECSRI makes it possible to trace the legacy of past policy choices and to identify structural dependencies that continue to expose economies to external shocks. In doing so, it equips policymakers not only with a diagnostic tool but also with a forward-looking framework for anticipating, mitigating, and reducing risks. The findings presented in this report are intended to provide an indicator-driven basis for discussion on the direction of national energy and climate policy in the context of the NECP update and the implementation of the European Green Deal.

2.2. Overview of energy and security risks in Poland

The compounded effects of the COVID-19 pandemic and Russia's invasion of Ukraine have revealed some of the most vulnerable aspects of Poland's energy policy. The primary channel through which these crises were transmitted from global energy markets to the national economy was the issue of energy affordability (Figure 2). The sharp increase in energy prices disproportionately affected households and significantly raised the risk of energy poverty. In response, the government adopted a set of extraordinary intervention measures, including direct subsidies for households, a freeze on energy prices, and compensation mechanisms to address shortages in the fuel market. This experience has also brought renewed attention to the persistent structural challenge of household dependence on fossil fuels, which continue to constitute a major heating source in the residential sector.

While the crisis revealed critical weaknesses in terms of affordability, it also underscored the benefits of earlier investments in infrastructure and diversification. In particular, the expansion of new gas interconnections and the diversification of supply sources and import routes allowed Poland to mitigate immediate fuel shortages and avoid more severe disruptions. At the same time, the crisis has highlighted the strategic imperative to accelerate the clean energy transition. Expanding renewable energy sources, improving energy efficiency, and reducing fossil fuel dependency are not only environmental or economic objectives, but have become essential conditions for strengthening Poland's long-term energy security and resilience.

Figure 2. The Energy and Climate Security Risks profile for Poland



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

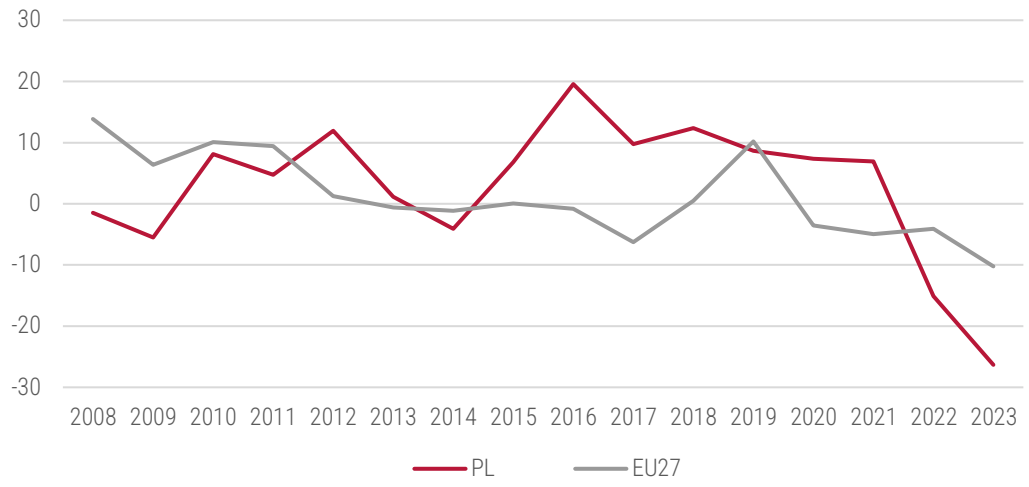
2.2.1. Geopolitical risk

Geopolitical risk has historically been one of the most critical dimensions of Poland's energy security. The country's reliance on fossil fuel imports from the Russian Federation created long-standing vulnerabilities, exposing it to potential supply disruptions and external price shocks. The war in Ukraine and the subsequent embargoes on Russian energy resources triggered a profound restructuring of Poland's supply architecture. In response, the country accelerated diversification efforts, invested in new infrastructure, and redirected supply routes. These measures have not only reduced immediate geopolitical exposure but also strengthened the resilience of the national energy system in the medium and long term.

Poland's natural gas supply has historically relied on imports, yet over the past decade the country has pursued an ambitious diversification strategy to strengthen its energy security. The years 2022–2023 marked a turning point in this process, as Poland eliminated its dependence on Russian supplies and restructured its import routes. Since 2023, gas imports from the Russian Federation have been fully discontinued and replaced by deliveries from Norway via the Baltic Pipe, alongside liquefied natural gas (LNG) supplies received through the Świnoujście terminal, primarily from the United States and Qatar. The commissioning of the Baltic Pipe and the expansion of regasification capacity at Świnoujście in 2022 shifted Poland's gas supply pattern from an east–west axis to a north–south direction. At the same time, new interconnections with Lithuania and Slovakia increased flexibility in managing imports and further enhanced supply security. As a result, reliance on Russian gas fell from 82% in 2009 to 20% in 2022, and was completely eliminated in 2023. Moreover, imports of Russian LNG ceased in 2022, and imports of Russian LPG in December 2024.

The combined effect of these diversification measures and embargo policies is clearly reflected in the evolution of Poland's geopolitical risk level, as captured by the ECSRI index. After 2021, the index shows a substantial decrease in geopolitical risk, primarily due to the complete phase-out of Russian gas imports and the embargo on coal. These shifts, supported by the timely completion of strategic infrastructure projects, effectively dismantled the long-standing dependence on eastern supply routes. As a result, Poland significantly reduced its exposure to geopolitical pressures, limiting the risks of supply disruptions and price shocks (Figure 3).

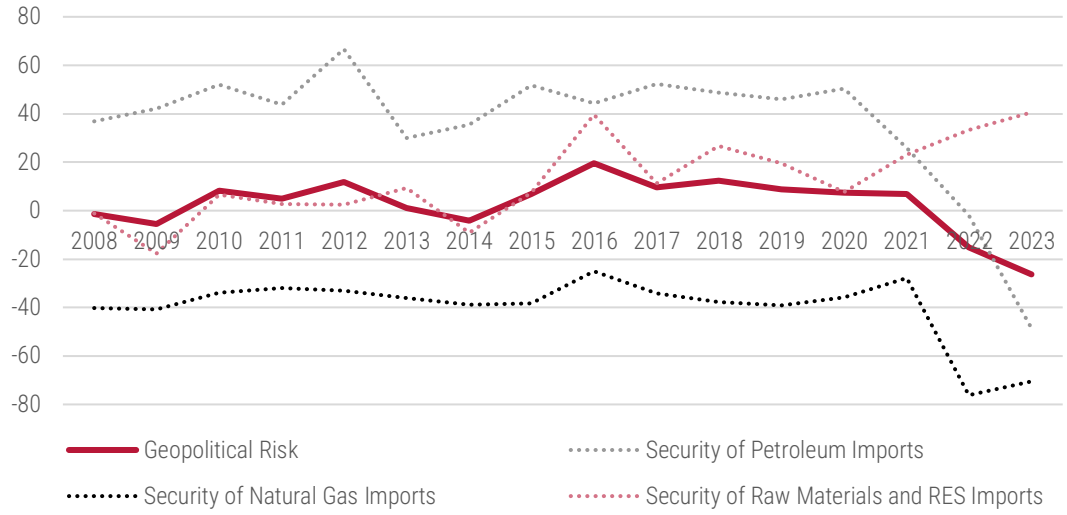
Figure 3. The development of the geopolitical risk subindex



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

Despite the increase in Poland's natural gas import dependency from 73.4% in 2012 to 81.3% in 2023 (Eurostat, 2025) the overall security of supply has improved. ECSRI results confirm that diversification measures have been the key driver of enhanced geopolitical security (Figure 4).

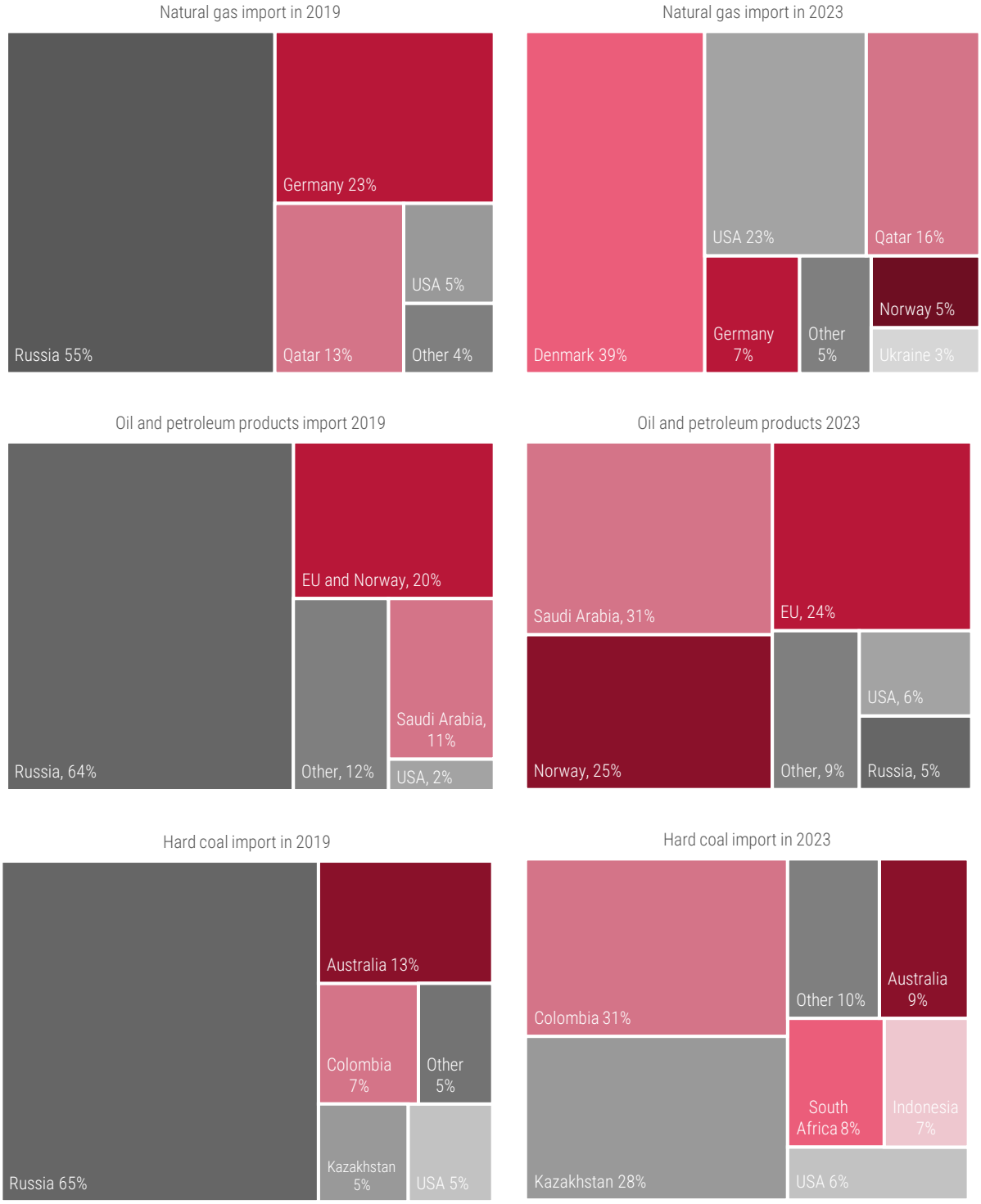
Figure 4. The main drivers of geopolitical risks in Poland



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

By facilitating maritime imports, recent investments have transformed the structure of Poland's gas suppliers, reducing dependence on eastward pipeline flows and creating a more balanced import portfolio (Figure 5). The embargo on Russian coal imports introduced in 2021 added further pressure to restructure fuel supply chains. Although Poland remains a major coal producer, particularly for domestic use, it had previously imported around 8 million tons of thermal coal annually from Russia to meet household demand. This accounted for nearly two-thirds of total coal imports, making Russia the dominant supplier for the residential sector. The ban on Russian coal required rapid diversification towards global markets, resulting in increased imports from Indonesia, South Africa, Colombia, and Kazakhstan. By 2023, Colombia and Kazakhstan had become Poland's most significant coal trade partners, together accounting for nearly 60% of total imports.

Figure 5. Import structure of natural gas, petroleum products and coal



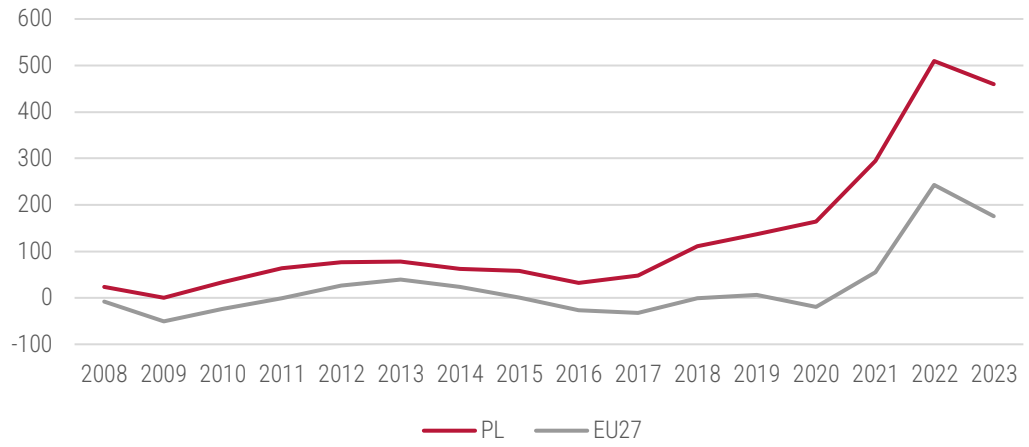
Source: Own calculations based on Eurostat [nrg_ti_sff]

While Poland's energy system remains import-dependent, the structural diversification of gas and coal supply chains has fundamentally reduced its geopolitical vulnerability. The decisive break with Russian energy imports, combined with investments in alternative infrastructure and suppliers, has transformed the country's risk profile. These developments position Poland more favourably within the European energy landscape, with a higher degree of resilience to external shocks and geopolitical tensions than in the past.

2.2.2. Affordability risk

The Affordability pillar of the ECSRI assesses the impact of energy and carbon prices on macroeconomic stability and the risk of energy poverty. Its indicators directly capture the effects of natural gas and electricity prices on household and business consumers. In addition, overall energy expenditures are identified as significant risk factors, as they are shaped by the price levels of different fuels, the structure of the energy mix, consumer choices, and efficiency levels. In this sense, high energy consumption combined with reliance on more expensive fuels has a strong influence on affordability risks (Figure 6).

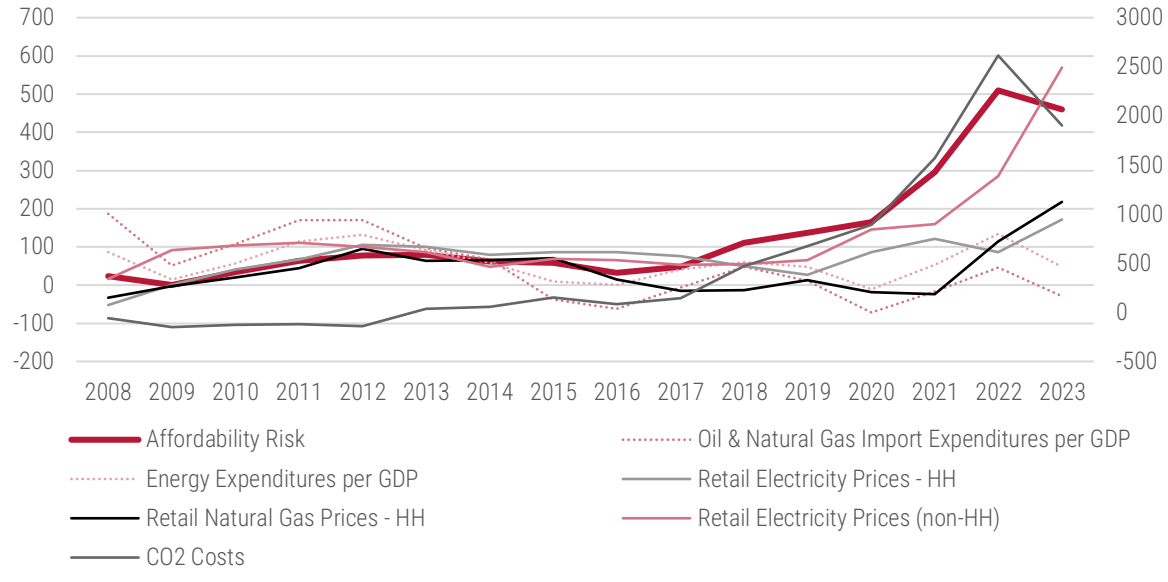
Figure 6. The development of the affordability risk subindex



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

Affordability remains the most critical component of Poland's overall energy and climate security risk. This stems primarily from the high share of fossil fuels in final energy demand (Figure 7). The current energy mix, still dominated by coal in electricity and heat production, makes Poland structurally vulnerable to rising CO_2 allowance prices. Continued reliance on coal has therefore been a major driver of affordability risk in recent years. This vulnerability was amplified during the energy crisis, when affordability risk increased sharply, reflecting heightened price pressure and volatility. More recently, however, affordability risk has begun to decline as the energy mix gradually diversifies—particularly through the growing contribution of renewables — reducing exposure to fossil fuel price shocks and carbon-cost pass-through.

Figure 7. The main drivers of affordability risks in Poland (CO_2 costs on the right scale)



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

The decline in CO_2-related costs observed in 2023 reflects three key factors. First, corporate initiatives to improve energy efficiency reduced demand for emission allowances. Second, the accelerated deployment of renewable energy sources (RES) and the related growth of self-generation lowered dependence on grid-supplied electricity, easing pressure on CO_2 compliance costs. These developments represent elements of a structural transition that is expected to enhance the long-term resilience of enterprises. Third, the reduction in industrial energy consumption in 2023 was linked to a broader economic slowdown, as GDP growth dropped sharply to 0.1%, compared with 5.3% in 2022.

Nevertheless, a key factor contributing to the heightened affordability risk has been the sharp increase in fuel prices. This trend intensified during the surge in energy market prices that began in 2019. Despite measures aimed at strengthening energy security, these price hikes had a significant impact on Polish consumers. Furthermore, the embargo on Russian coal, implemented in April 2022, intensified supply constraints – especially for individual households and local heating plants that rely heavily on coal as their primary heating source.

Government intervention was therefore necessary to contain the social and economic consequences of price volatility. In 2022, a range of measures was introduced, including direct subsidies for fuel purchases, temporary freezes of electricity and natural gas prices for households, and targeted support to limit heating costs. The gradual lifting of these measures began in 2024 and continued in 2025. Nevertheless, the need to shield consumers from sudden price shocks has reinforced policymakers' awareness of energy poverty and the importance of enhancing household resilience during the energy transition.

Taken together, these market and policy developments are reflected in the ECSRI: affordability risk has been consistently elevated in Poland compared with other EU countries, largely due to fossil fuel dependence, rising CO_2 costs, and exposure to volatile energy prices. While temporary declines in 2023 were linked to efficiency gains, RES development, and weaker industrial demand, structural affordability challenges remain.

While Poland has made progress in addressing affordability risks through diversification, efficiency measures, and support programs, the combination of high fossil fuel dependence, price volatility, and poor housing conditions continues to weigh heavily on households. Sustained investment in energy efficiency, accelerated RES deployment, and targeted protection of vulnerable groups will be essential to reduce affordability risk and ensure a socially just energy transition.

2.2.3. Reliability risk

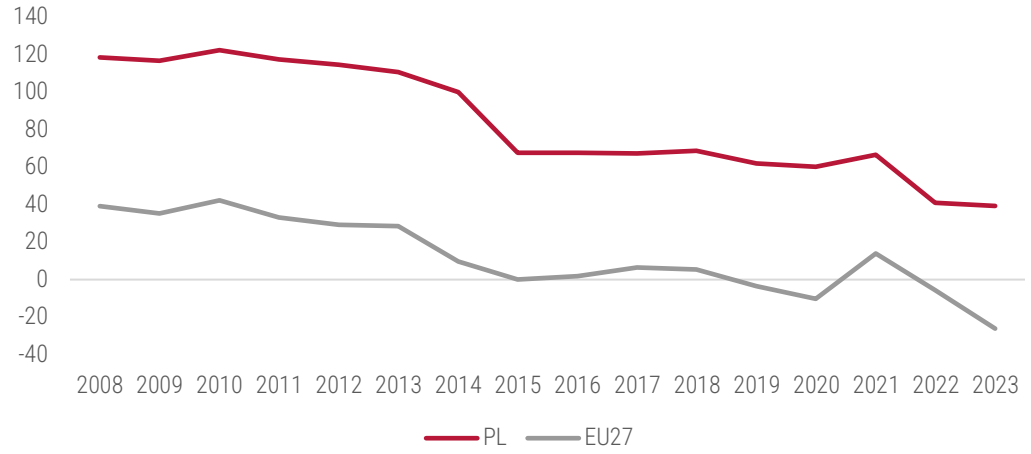
The Reliability pillar reflects the extent to which the national economy and individual sectors are exposed to potential energy supply disruptions. This sub-index captures several key factors, including natural gas storage levels, the resilience of gas and electricity systems, the diversity of power generation capacity, and the energy intensity of households. Reliability risks are particularly significant in the context of growing electrification and the continued dependence on single-entry points for critical energy carriers.

This component of the ECSRI has shown systematic improvement over time (Figure 8), although Poland's risk level remains higher than the European average. The main driver of improvement has been the gradual diversification of energy sources (Figure 9). Since 2009, the role of renewable energy in the national energy mix has expanded, improving accessibility for households and businesses. Nevertheless, the still-dominant share of coal in electricity and heat production continues to keep Poland's reliability index above the EU average.

The primary indicator of reliability risk is the low diversity of power generation capacity. Heavy reliance on coal in both the electricity and heating sectors has limited diversification. While domestic coal production reduces exposure to geopolitical import shocks, this dependence generates other vulnerabilities, particularly to rising CO_2 allowance prices. In turn, this risk drives electricity and heating costs upward and may require repeated government interventions to preserve affordability.

Addressing these challenges requires a structural shift away from coal, with a focus on renewable and low-emission sources, as well as investments in energy storage. Achieving a more resilient system will also require deeper integration with European energy markets and the adoption of flexible system management mechanisms to enhance adaptability and efficiency.

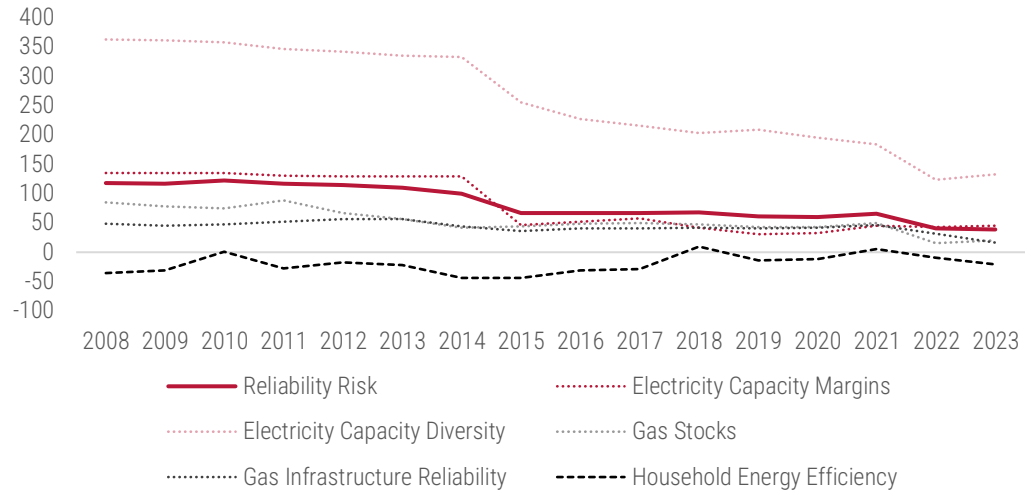
Figure 8. The development of the reliability risk subindex



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

Household energy efficiency remains another area of concern. Despite progress in the wider energy sector, this component of the reliability sub-index has remained relatively unchanged. Improving the energy performance of older residential buildings should therefore be a policy priority, particularly for households vulnerable to energy poverty. Measures such as thermal insulation, modernization of heating systems, and promotion of renewable-based heating solutions can improve living standards while reducing system-level risks. Financial support schemes, targeted incentives, and awareness campaigns will be essential to ensure the broad uptake of energy efficiency improvements.

Figure 9. The main drivers of the reliability risks in Poland



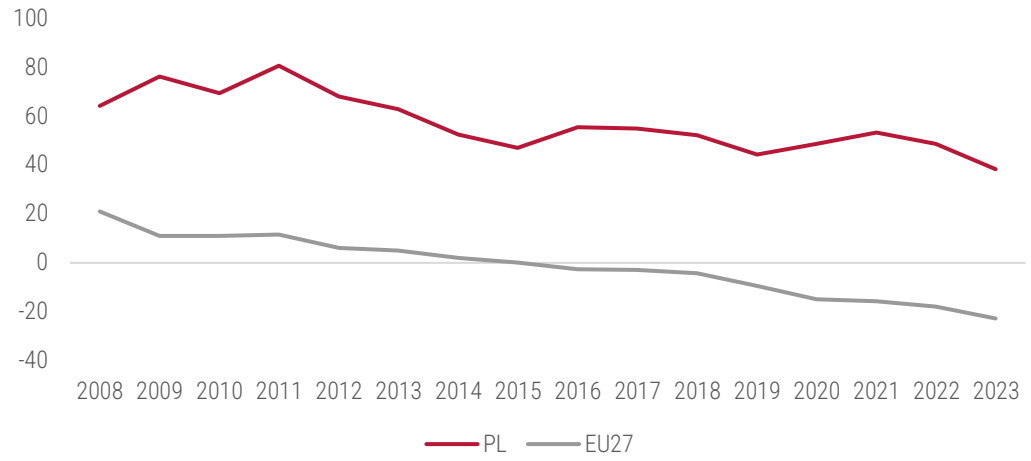
Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

The ECSRI results capture these dynamics: Poland's reliability score has improved in recent years, reflecting supply diversification and the expansion of renewable energy sources. At the same time, the continued prominence of coal in the generation mix underscores the need to accelerate investment in low-carbon capacity, system flexibility, and energy efficiency. This creates a set of strategic trade-offs. A larger role for natural gas could enhance short-term flexibility, but would also increase import exposure. Consequently, Poland's long-term security strategy increasingly emphasises nuclear power as a stable, low-carbon substitute for coal. Given that large-scale nuclear deployment remains at an early stage, near-term reliability gains will depend primarily on faster renewables rollout, strengthened efficiency measures, and targeted upgrades of grids and flexibility infrastructure. Taken together, these measures can support a more resilient and adaptable energy system during the transition period.

2.2.4. Sustainability risk

Poland has experienced dynamic economic and sectoral changes, aligning with global efforts to reduce greenhouse gas emissions. Nevertheless, its exceptionally high reliance on coal for energy production makes reducing emission intensity a persistent challenge. By 2022, Poland had lowered its national emissions by 23% compared to 1990 (Figure 10). Despite this progress, the energy sector, including electricity and heat generation as well as selected industrial installations, remains the largest source of emissions covered by the EU Emissions Trading System (ETS). Current mitigation efforts are therefore focused on reducing coal dependency within these sectors. Moreover, the planned expansion of the ETS to the building and transport sectors is expected to accelerate emission-reduction measures across the economy.

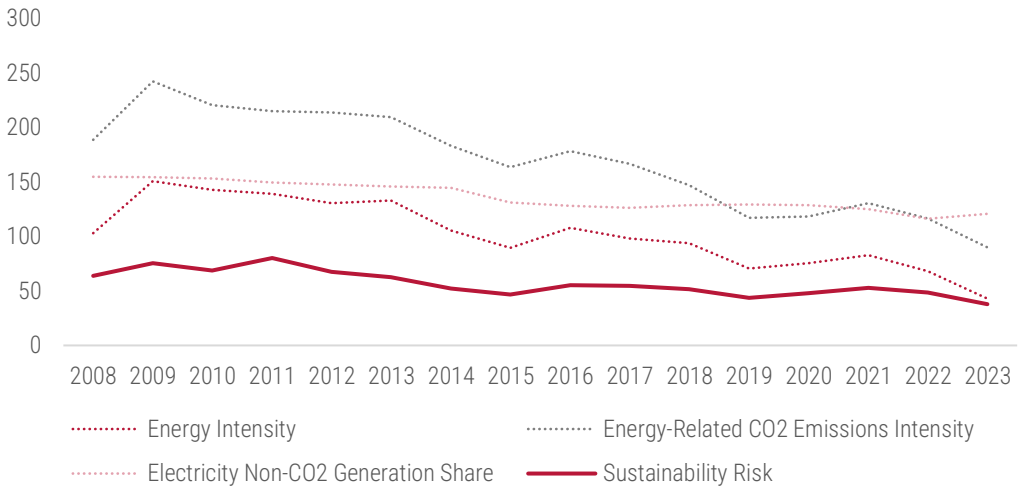
Figure 10. The development of the sustainability risk subindex



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

Improvements in energy intensity and emission intensity provide additional evidence of Poland's progress toward decarbonization. Since 2008, both energy intensity and energy-related CO_2 emissions intensity have shown a marked downward trend, reflecting gradual efficiency gains across the economy and structural changes in the energy sector. At the same time, the share of non-CO_2 electricity generation has increased only moderately, indicating that while efficiency improvements are reducing carbon intensity, the pace of clean generation deployment has been slower (Figure 11). This imbalance underscores the importance of accelerating renewable energy and low-carbon capacity development to complement efficiency gains and ensure sustained reductions in emissions.

Figure 11. The main energy-related drivers of the sustainability risks in Poland

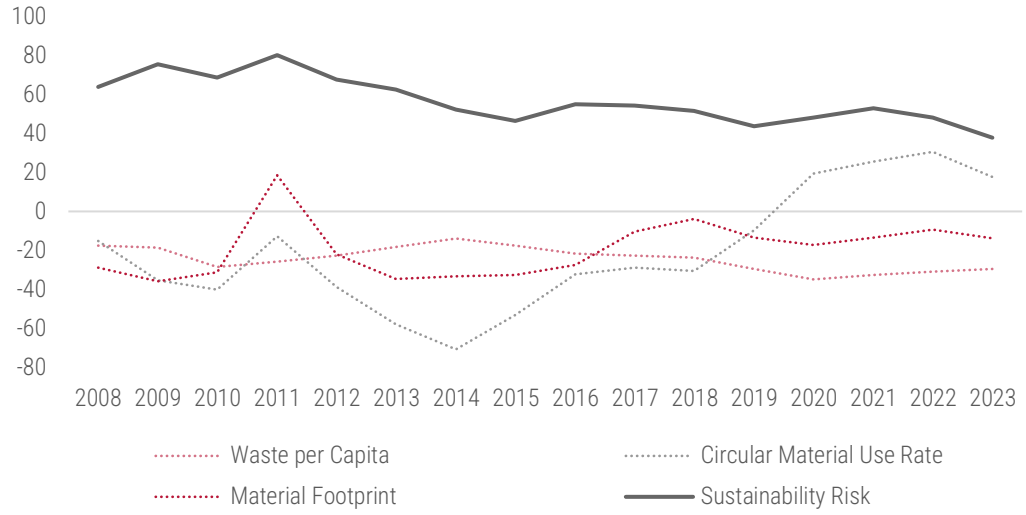


Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

A central element of decarbonization is lowering overall energy consumption in all sectors: industry, services, agriculture, residential buildings, and transport. Improving energy efficiency requires the widespread adoption of low-carbon technologies, optimization of industrial processes, and modernization of residential and commercial infrastructure. At the same time, decarbonization necessitates greater support for clean energy production, especially renewable energy sources (RES), both within the national energy system and at household and industrial levels. It also entails the development of low- and zero-emission transport as well as technological innovations that reduce fossil fuel use in industrial processes.

The material footprint (Figure 12) reflects the total volume of resources extracted to meet domestic consumption of goods and services. In Poland, the material footprint remains slightly above the EU average, with non-metallic minerals representing the largest share due to their strong link with construction activity. Although Poland's economy demonstrates varying levels of raw material intensity, the overall trend points upward. Resource productivity, which measures the economic value generated per unit of raw material, remains relatively low: in 2023, one kilogram of raw materials generated GDP worth 1.7 PPS, compared with an EU average of 2.7 PPS. This placed Poland 21st among EU member states.

Figure 12. The main circular economy-related drivers of the sustainability risks in Poland



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

Waste generation trends further illustrate these challenges. Until 2015, the volume of waste produced in Poland increased annually. Since then, total waste volumes have gradually declined, primarily due to reductions in industrial waste. By contrast, municipal waste has been rising. In 2023, municipal waste generation reached 367 kilograms per capita, compared with an EU average of 511 kilograms. Although Polish households produce less waste than the EU average, the upward trend highlights growing pressures on municipal waste management systems.

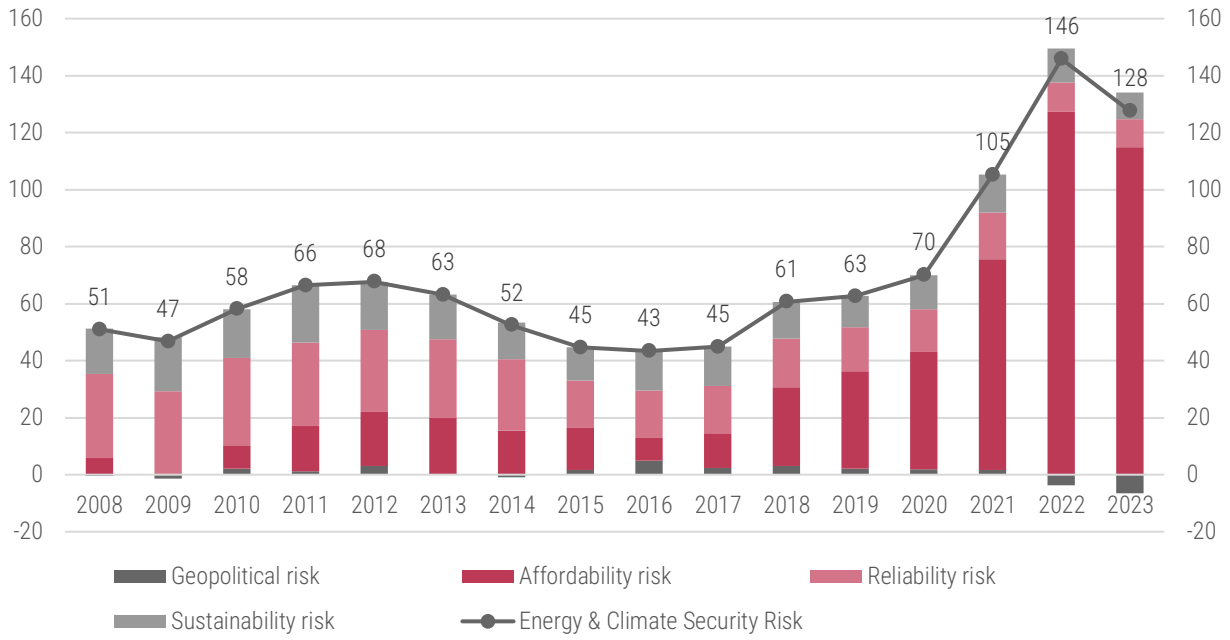
Sustainable consumption and production also require advancing circular economy practices, particularly the secondary use of materials. In Poland, approximately 10% of the materials used annually in production processes are recovered and reintroduced into the economic cycle, compared with an EU average of around 12%. This remains a significant challenge, given the EU objective of doubling the circular use rate by 2030. For Poland, this implies the need to double the current share of recycled material use within the next few years.

While Poland has made progress in expanding renewable capacity, improving material efficiency, and reducing industrial waste, its performance in sustainability indicators remains below the EU average. Continued reliance on coal, low resource productivity, and limited progress in circular material use highlight structural challenges for the coming decade. The transition toward a more sustainable economy will therefore require not only large-scale investments in clean energy and nuclear capacity but also systemic improvements in resource efficiency, waste management, and circular economy practices. Strengthening these areas will be essential to ensure that economic development in Poland becomes both environmentally sustainable and aligned with EU climate and resource efficiency objectives.

2.3. Key risk drivers and vulnerabilities

The recent energy crisis has exposed structural weaknesses in Poland's energy system and underlined the need for a more comprehensive approach to energy and climate security. Progress in supply diversification and reduced import dependency has lowered geopolitical exposure, yet vulnerabilities persist across economic, social, and infrastructural dimensions. In particular, the crisis demonstrated how external shocks translate rapidly into domestic cost pressures, creating distributional and political strains that can complicate the transition towards a low-carbon system. Importantly, the post-crisis easing of pressures has been only partial, with risk levels remaining elevated compared with the pre-2021 period (Figure 13).

Figure 13. Energy and Climate Security Risk in Poland, 2028-2023



Source: Center for the Study of Democracy, Energy and Climate Security Risk Index

The Energy and Climate Security Risk Index further clarifies the scale and composition of these risks. While all four pillars – geopolitical, affordability, reliability, and sustainability – remain relevant, their relative importance differs markedly. Affordability is the dominant driver of Poland's overall risk profile and has accounted for most of the recent increase in the aggregate index, particularly during the 2022 peak. Sustainability challenges rank second due to their structural, long-term nature. Reliability risks have improved gradually, contributing less to short-term volatility. Geopolitical risk declined markedly following diversification measures and its contribution to the overall ECSRI became comparatively small. Overall, the index suggests that recent fluctuations in Poland's risk profile have been shaped primarily by cost exposure rather than abrupt changes in reliability or sustainability, reinforcing the case for prioritising structural affordability measures alongside sustained decarbonisation efforts.

Building on this risk profile, it becomes clear that Poland's energy vulnerabilities are not abstract but rooted in concrete structural features of its system. The system remains constrained by several interlinked challenges:

1. continued dependence on fossil fuels,
2. infrastructural and system constraints,
3. inefficiencies in the residential sector and social disparities linked to energy poverty,
4. policy coordination.

Examining these areas in detail allows for a clearer understanding of how systemic risks translate into specific challenges for the energy transition.

Dependence on fossil fuels

Poland's energy mix continues to rely heavily on fossil fuels, particularly coal in the electricity and heating sectors and imported oil in the transport sector. This dependency exposes the country to risks related to volatile fuel prices, rising costs of emission allowances under the EU Emissions Trading System, and disruptions in physical availability of fossil fuels. Although diversification of natural gas supplies has progressed, oil import dependence remains a strategic vulnerability. Moreover, the ongoing coal phaseout, while necessary, increases the urgency of securing alternative sources of affordable and reliable energy.

Infrastructure and system constraints

Another critical vulnerability lies in the limited flexibility of Poland's energy infrastructure. The expansion of renewable energy sources has outpaced the development of supporting grid systems, storage capacity, and demand management tools. Without sufficient investment in transmission and distribution networks, as well as storage technologies, the integration of variable renewable sources will face systemic barriers. The lack of robust mechanisms to stabilize the energy system—particularly in the face of rising electricity demand—creates risks to supply reliability and may slow down the pace of the transition.

Residential sector inefficiencies

The residential sector has emerged as one of the most vulnerable areas within Poland's energy system. A large share of the building stock remains highly energy-inefficient, leading to excessive consumption and high energy costs for households. The prevalence of coal-based heating in households represents both an environmental and a security challenge, as it links domestic consumption to volatile fossil fuel markets and rising decarbonization costs. The persistence of these patterns demonstrates that the residential sector has been insufficiently integrated into national energy strategies, despite its potential to significantly reduce demand pressures and improve resilience.

Social vulnerabilities and energy poverty

The shortcomings of the residential sector directly feed into broader social vulnerabilities. A significant share of households faces energy poverty, making them disproportionately affected by price shocks and policy-driven cost increases. Without adequate protective measures, the energy transition risks exacerbating inequalities between income groups and regions, particularly by widening the gap in housing quality. The social sustainability of the transition therefore depends on addressing these vulnerabilities and ensuring that its benefits are equitably distributed.

Fragmentation and policy coordination

Finally, vulnerabilities also arise from institutional and governance-related factors. While Poland has developed strategies to diversify energy supply and stimulate investment in renewables, the transformation process inherently affects multiple sectors of the economy as well as specific regions where carbon-intensive industries are concentrated. As a result, the policy framework requires multidimensional coordination that integrates national, sectoral, and regional perspectives. Moreover, the success of transition policies depends on the availability of stable financial frameworks and the effective use of EU support mechanisms. Insufficient coordination or delays in implementation may slow down the pace of reforms and increase the risks associated with external shocks.

In sum, Poland's key vulnerabilities lie in its continued dependence on fossil fuels, infrastructural bottlenecks, inefficiencies in the residential sector, the persistence of energy poverty, and challenges in policy coordination. These weaknesses demonstrate that energy security must be addressed not only in terms of supply diversification but also through demand-side measures, social protections, and institutional effectiveness. By recognizing these structural vulnerabilities, policymakers and stakeholders can better understand the risks facing the energy system. Prioritizing energy efficiency measures, diversifying energy sources, ensuring access to clean energy, and providing protective measures for vulnerable households should constitute the key directions of action to enhance Poland's resilience and security on its path toward energy transformation.

3. Assessment of revised National Energy and Climate Plan for Poland

Assessing national strategic documents is a crucial step in evaluating Poland's energy and climate security. While the Energy and Climate Security Risk Index (ECSRI) provides a structured, comparative measure of vulnerabilities, the effectiveness of policy responses depends on the extent to which these risks are recognized and addressed in national frameworks. Key documents such as the National Energy and Climate Plan defines the country's long-term priorities, yet their alignment with the risk landscape identified by the ECSRI remains uneven. A critical review of these strategies helps identify gaps and inconsistencies and shows whether policy design anticipates the evolving challenges of the energy transition. In this sense, the intersection of ECSRI findings with the content of national policy documents offers a valuable analytical perspective, revealing both areas of progress and domains where enhanced coordination and ambition are required.

3.1. NECP modelling and scenarios

The update of Poland's NECP coincided with the urgent need to establish a comprehensive framework for national energy policy and the Social Climate Plan. Prior to this update, Poland lacked a strategic document that systematically addressed the requirements of EU climate policy. The NECP therefore constitutes the first and most extensive attempt to outline a decarbonization pathway for the country.

Methodologically, the NECP relies on established energy system modelling tools and adopts a bottom-up approach. This framework enabled detailed projections of energy demand across all sectors and the development of optimized supply-side scenarios. This approach ensured that both consumption and production dynamics were considered, providing integrated insights into potential transition pathways. In addition, the application of a Computable General Equilibrium (CGE) model captured broader macroeconomic and labour market impacts, which represents a further methodological strength by situating the energy transition within its wider socioeconomic context (Ministry of Energy, 2025).

In line with Regulation (EU) 2018/1999, the updated NECP presents two analytical scenarios: WEM (With Existing Measures), based on the continuation of policies and measures already in place, and WAM (With Additional Measures), which incorporates additional climate and energy policy instruments. In the NECP, WEM is treated as a "balanced transition" pathway that largely follows current technological, organisational, and economic trends, assuming gradual evolution rather than disruptive change or breakthrough innovation. WAM is framed as an "accelerated transition" pathway aimed at implementing the Fit for 55 agenda while maintaining energy security and economic competitiveness. The NECP therefore presents targets and indicators as ranges derived from the WEM and WAM scenarios. This interval-based approach supports planning under macroeconomic and technological uncertainty and helps reconcile policy ambition with deliverability.

Nevertheless, the projections indicate that by 2030 Poland meets only part of the Fit for 55-related benchmarks under the accelerated pathway, with an estimated 52.7% reduction in greenhouse gas emissions relative to 1990, compared with the EU-wide target of 55%. This reflects the short implementation window to 2030 and the starting point of the transition, which together constrain the scale and pace at which capital-intensive investments and technology deployment can be delivered.

The scenario results also underline a structural feature of Poland's emissions profile. Power and heat generation remain the largest source of greenhouse gas emissions due to the continued role of coal in the energy mix. At the same time, the energy sector is expected to account for the largest share of emissions reductions, as coal capacity is progressively phased down and replaced by lower- and zero-emission sources.

Beyond emissions outcomes, the scenarios incorporate feasibility constraints and socioeconomic impacts that shape the transition pathway. In the power sector, they reflect the technically achievable pace of coal phase-out and the need to maintain adequacy and system stability through dispatchable resources, flexibility, and grid development. In industry, they account for capital intensity, technical feasibility, and technology availability for process modernisation. They also consider labour market implications, emphasising durable, high value-added job creation and skills development, alongside broader effects on economic development and competitiveness.

3.2. Stakeholder engagement

The consultation process for the updated NECP began even before the document's formal submission for review. The Ministry of Climate and Environment, supported by experts and industry organizations, conducted a series of meetings, debates, and preliminary consultations with representatives from various sectors to assess Poland's energy transition potential and development scenarios.

In November 2023, a dedicated working group was established under the government's initiative to update the NECP. It included representatives from eight ministries, the Energy Regulatory Authority, the Government Plenipotentiary for Strategic Energy Infrastructure, and independent energy experts. In parallel, the ministry launched an open dialogue with non-governmental organizations (NGOs) to integrate their feedback from the early stages of the process. Representatives of the Ministry also participated in parliamentary committee meetings and conferences involving employers' and workers' organizations.

A key milestone in the pre-consultation phase was the meeting held in September 2024, attended by around 70 representatives of NGOs, business associations, and trade unions. Discussions focused on preliminary WAM scenario results and draft policy priorities. Central topics included the development of transmission infrastructure, strategies to prevent the so-called "gas trap", and mechanisms to ensure energy security during the phase-out of coal-based generation. Participants also highlighted the need to increase support for emission reduction in non-energy sectors such as industry and transport.

Formal public consultations were conducted in two stages: the first during October–November 2024, and the second in February 2025 as part of the strategic environmental assessment procedure. A broad spectrum of stakeholders took part, including public administration bodies, regional and local governments, enterprises, NGOs, trade unions, and citizens. The draft documents were made publicly available online and in print. In total, more than 4 000 comments were submitted by 128 entities, addressing social, economic, environmental, and technical aspects (Ministry of Energy, 2025). However, in the absence of a published consultation report or response matrix, it is not possible to systematically trace individual comments to specific changes in the final NECP.

Feedback covered a wide range of issues – from calls for faster renewable energy deployment to appeals for maintaining the role of fossil fuels and managing the pace of transition. Some comments expressed concerns about the socio-economic implications of decarbonization in mining regions, while others advocated for more ambitious climate measures. Many submissions were editorial, seeking clarification or data updates. As a result of the consultation process, analytical projections in both the WEM and WAM scenarios were refined, and additional policy measures were incorporated. The document was also updated to provide greater precision on topics such as building renovation, industrial decarbonization, transport, agriculture, and renewable energy development.

Comments related to the environmental impact assessment mainly concerned the effects on Natura 2000 areas, potential transboundary impacts, and the application of the precautionary principle. Stakeholders also requested clearer differentiation between positive and negative impacts and the inclusion of non-infrastructure sectors, such as agriculture and aviation, in the analysis.

Overall, the consultation process appears extensive and procedurally inclusive, with participation from a broad range of stakeholder groups. At the same time, without a published response matrix it is difficult to assess the depth of stakeholder influence or to identify which proposals were accepted, modified, or rejected. The evidence of influence is therefore indirect: the NECP reports that analytical projections (WEM/WAM) were refined and that additional measures and clarifications were introduced following consultations, while the overall direction of the document remained largely unchanged. This suggests incremental improvements in scope and precision. However, the consultation process also contributed to a broader national debate on the future of Poland's energy and climate policy.

The NECP update process illustrates the complexity of advancing a low-carbon transition in a coal-reliant economy. The combination of pre-consultations and public consultations points to a stronger emphasis on participation and analytical underpinning in the policy process. Continued stakeholder engagement will remain important for aligning national actions with domestic priorities and EU climate objectives.

3.3. Targets and measures across the five NECP dimensions

3.3.1. Decarbonization

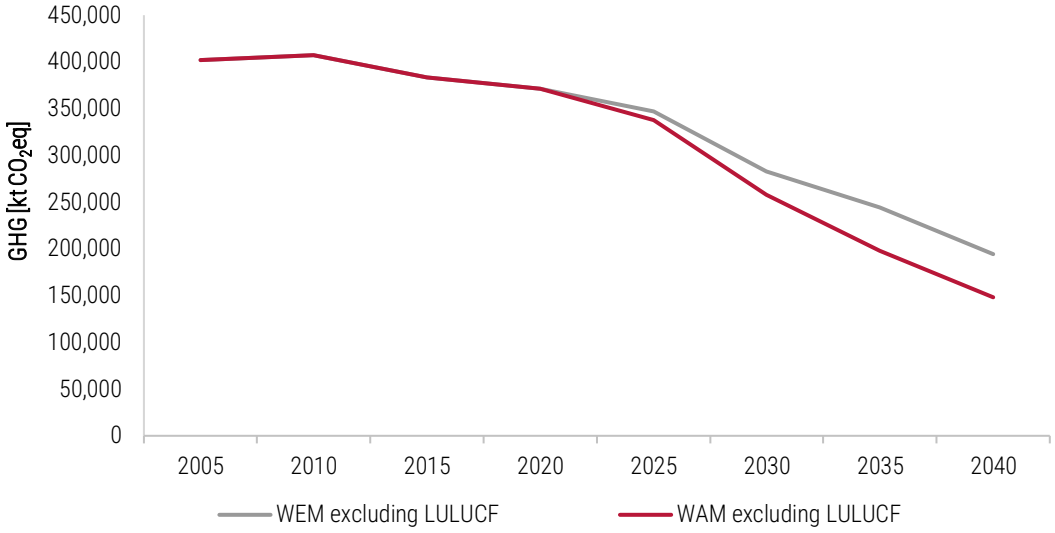
Addressing emission reduction is recognized in EU policy as the overarching goal of climate and energy action. In the Polish context, however, it is treated on an equal footing with other dimensions of the energy transition. The document stresses that effective decarbonisation must go hand in hand with ensuring energy security, as a stable and resilient energy system is a prerequisite for moving the economy onto a net-zero pathway. Greenhouse gas (GHG) reduction is presented as a cross-cutting priority across all sectors, though the pace and potential of change differ between industries. Achieving climate neutrality is to be pursued not only through lowering emissions but also by enhancing absorption capacities. In the revised scenarios, Poland is projected to reduce GHG emissions by nearly 53% in WAM scenario in 2030 (Table 1) and by 75% in 2040 (Figure 14) compared with 1990 levels. Compared with the 2019 plan, the faster pace of decarbonisation is evident: even under the WEM scenario, current policies in non-ETS sectors are expected to deliver a 12% reduction in emissions – almost twice the previous target. A major contribution comes from phasing out coal in households. Under the more ambitious WAM scenario, Poland is projected to surpass its national target, achieving a 19% GHG reduction in non-ETS sectors by 2030. This progress would ensure compliance with the Effort Sharing Regulation (ESR), which requires a 17.7% reduction relative to 2005 levels.

Table 1. Poland's GHG emission reduction targets by 2030: NECP projections vs. EU regulatory targets

Category	NECP (2019)	NECP (2025)		Target for Poland
		WEM	WAM	
GHG emissions reduction across the entire economy (vs. 1990, LULUCF included)	-30%	-43.3%	-52.7%	Contribution to the EU target -55% Country target not specified
ETS sectors (vs. 2005)	Not specified	-46.1%	-50.9%	Contribution to the EU target -62% Country target not specified
Non-ETS sectors (vs. 2005)	-7%	-12.0%	-19.4%	-17.7%
LULUCF contribution	Not specified	-28.8 Mt	-46.5 Mt	-38.1 Mt

Source: Own elaboration

Figure 14. GHG emission reduction paths by 2040



Source: Own elaboration based on NECP (2025 update).

This accelerated reduction is largely driven by the expansion of renewable energy sources (RES), identified as the main instrument of decarbonisation across power generation, heating, transport, industry, and construction.

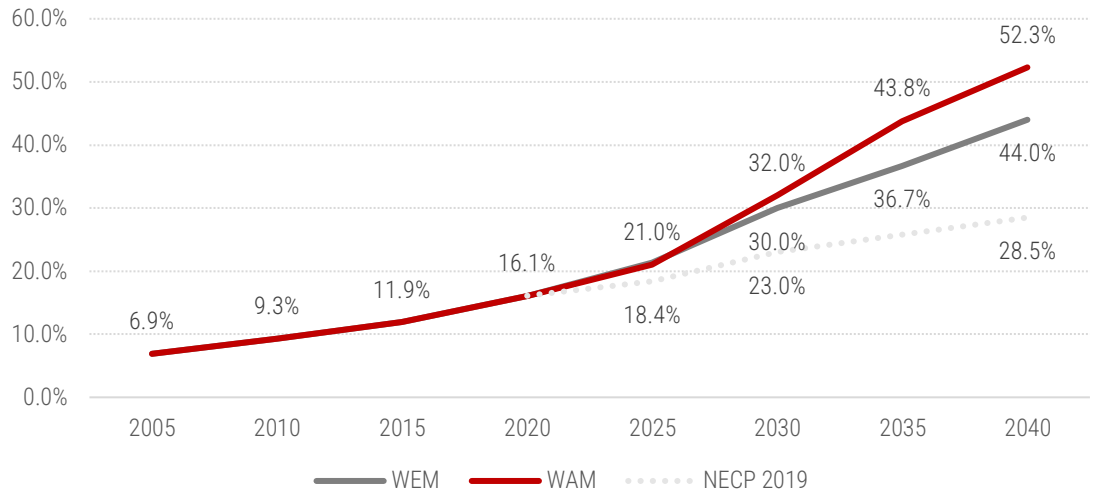
Poland aims to achieve a 32% share of renewable energy sources (RES) in gross final energy consumption by 2030 (Table 2) and to exceed 52% by 2040 (Figure 15), with progress driven by a combination of technological innovation and regulatory measures.

Table 2. Poland's RES share targets by 2030: NECP projections vs. EU regulatory targets

Category	NECP (2019)	NECP (2025)		Target for Poland
		WEM	WAM	
In final energy consumption	21-23%	30.0%	32.0%	According to Impact Assessment to RED III: 31-32%
Energy sector	32%	51.6%	53.2%	Not specified
Heating sector	28.4%	31.6%	36.5%	Increase by 0.8-1.1 pp annually
Transport sector	14%	16.5%	16.5%	29% or 14.5% emission reduction

Source: Own elaboration

Figure 15. RES development projections by 2040



Source: Own elaboration based on NECP (2019 and 2025 update).

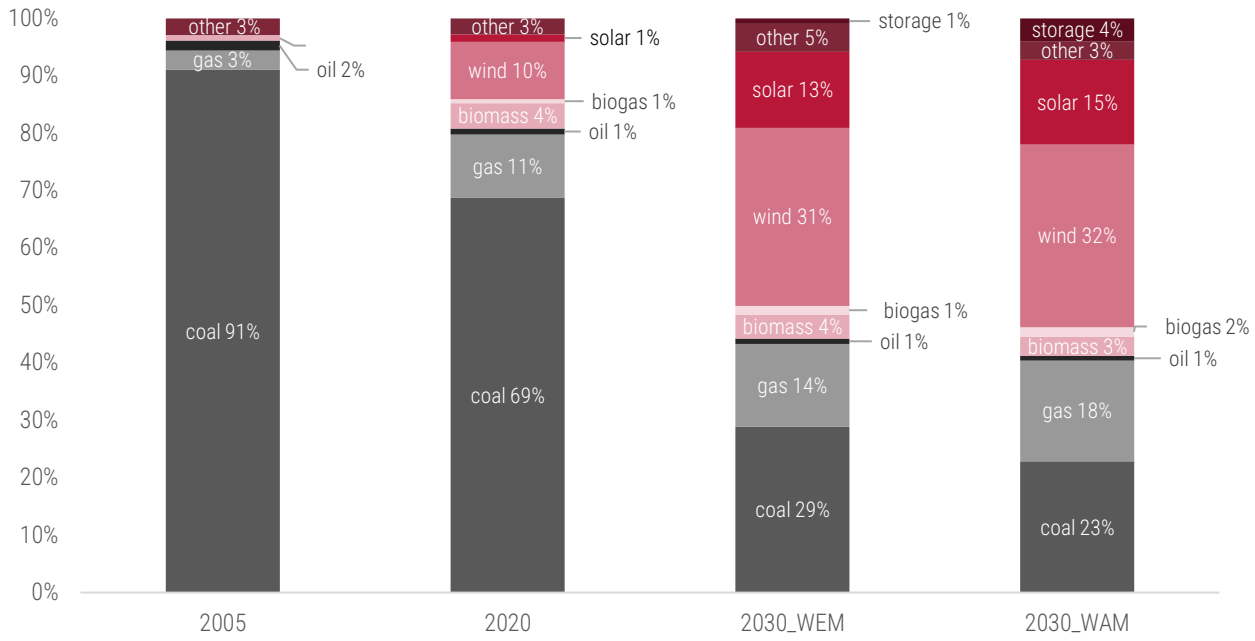
Energy sector

The share of renewable energy sources in electricity generation is projected to reach 53% by 2030 (Figure 16) and almost 70% by 2040, a considerable increase compared to the 32% target outlined in the 2019 NECP. This progress will be driven mainly by the expansion of onshore wind, solar photovoltaics, and offshore wind farms, with the latter entering the system from 2026 onwards. Renewables will thus play the central role in reducing emissions by 2030, while nuclear power, expected to be deployed after 2035, will provide additional support for deep decarbonisation. Complementary solutions, such as carbon capture and storage (CCS) and carbon capture and utilization (CCU), may further contribute, particularly in gas-fired, biomass and biomethane-based plants (including BECCS – bioenergy with carbon capture and storage). However, CCS technologies are anticipated to be applied primarily in industrial decarbonisation, with only a supporting role in the power sector.

Poland's electricity system has historically been dominated by coal, reflecting both resource availability and past political decisions. In 2024, coal still accounted for over 60% of generation. The updated NECP foresees a significantly faster pace of coal phase-out compared to the 2019 plan: under the WAM scenario, the combined share of hard coal and lignite is expected to fall to 24% by 2030. In contrast, the 2019 NECP assumed that coal would only drop below 50% in the 2030s. The decline in coal use in power generation and heating is expected to accelerate after 2028, once most coal units cease to receive capacity market support.

In the transitional period, part of the coal capacity will be replaced by gas-fired units, which are less emission-intensive. To avoid a long-term increase in dependence on gas imports – the so-called "gas trap" – the strategy foresees the use of domestic gas resources, including gas recovered from mines. In the longer term, gas units may be adapted to operate with decarbonised gases such as biomethane and hydrogen. While hydrogen is expected to be prioritised for industrial applications in the first instance, its role in the power sector may gradually expand at a later stage. With the growing share of zero-emission sources, the national power system will shift towards a more decentralised architecture, reinforced by the development of energy communities. Nuclear power, expected to be deployed after 2035, will play a central role in ensuring capacity adequacy as coal units are gradually phased out.

Figure 16. Gross electricity generation by fuel – projections



Source: Own elaboration based on NECP (2025 update).

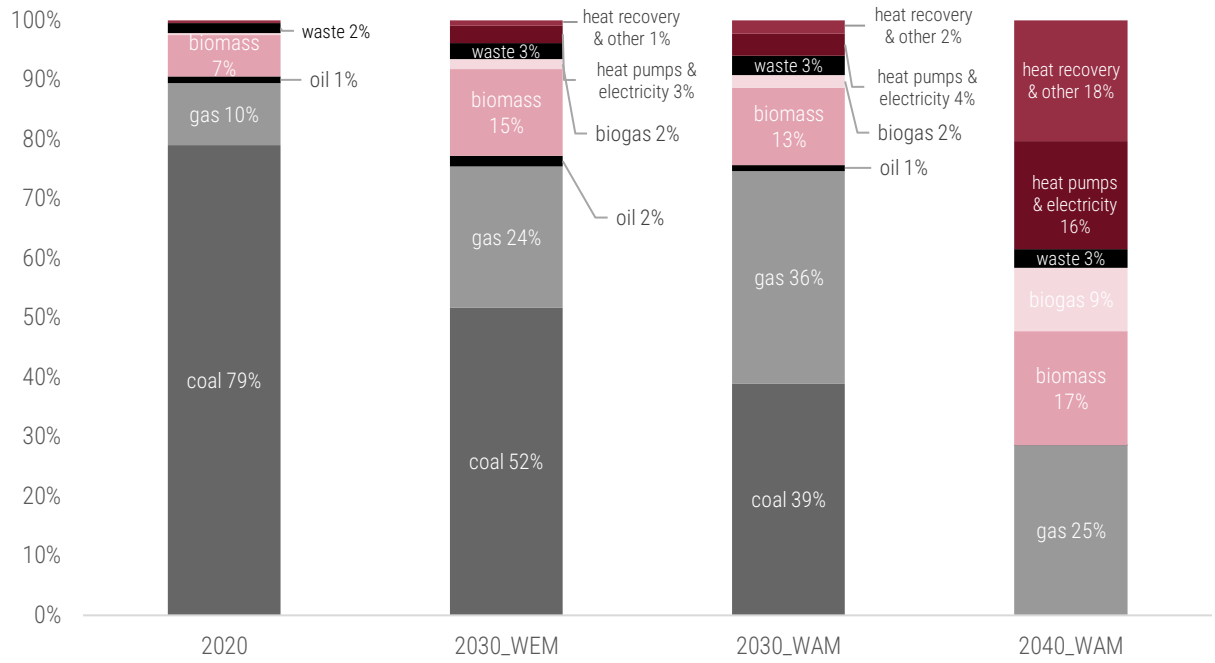
Heating sector

The heating sector is of fundamental importance for society in the Polish climatic context. Similar to power generation, coal remains the dominant energy source for both district and individual heating. The transition of this sector towards low- and zero-emission solutions is therefore one of the key elements of the national decarbonisation pathway. Poland plans to reach a 36.7% share of renewables in heating and cooling by 2030, rising to nearly 70% by 2040. In addition, the production of district heat from coal is to be phased out by the end of 2035.

In district heating, the transition will involve the increased use of biomass in cogeneration plants, large-scale heat pumps, waste-to-energy facilities, and heat recovery technologies (Figure 17). The draft NECP also indicates that investments in gas-fired cogeneration will remain necessary in the near term, complementing renewable and low-carbon solutions, though these may gradually be replaced with biomethane or hydrogen in the future. A critical challenge is the decarbonisation of heating networks in both large and medium-sized cities. This will require the deployment of high-efficiency technologies, including cogeneration, alongside electrification and renewable energy development, integrated with thermal storage systems.

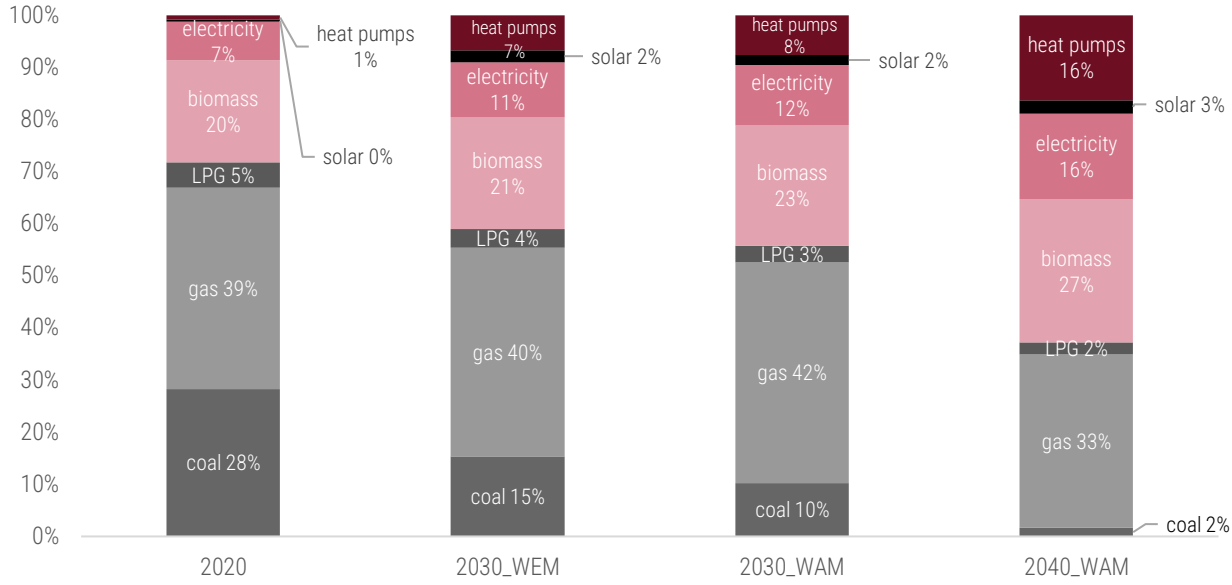
In the individual heating, coal-fired installations are expected to be replaced with alternative solutions such as heat pumps, particularly when combined with thermal storage (Figure 18). Importantly, replacing heating sources often requires parallel investments in building retrofits, as improved energy efficiency reduces heat demand. This is especially relevant given Poland's climatic conditions, characterised by long periods of low winter temperatures. Inadequate thermal insulation may otherwise result in challenges related to both heating costs and maintaining thermal comfort.

Figure 17. District heating generation by fuel – projections



Source: Own elaboration based on NECP (2025 update).

Figure 18. Heating sources in households – projections



Source: Own elaboration based on NECP (2025 update).

Transport and industry

The transport sector is one of the most challenging areas for increasing the share of renewable energy in overall energy consumption. Under RED III, EU member states are required to achieve a 29% share of RES in final transport energy use or reduce greenhouse gas emission intensity by 14.5%. According to NECP projections, however, Poland's RES share in transport will reach only around 18.9% by 2030 and approximately 50% by 2040. Meeting the 2030 target is considered unrealistic, primarily due to the sector's rapid growth, insufficient infrastructure, and the limited availability of alternative fuels.

To address these challenges, the updated NECP outlines a range of measures focusing on urban transport decarbonisation, including the mandatory purchase of zero-emission buses and the creation of clean transport

zones. The plan also emphasises reducing the transport intensity of the economy, expanding public transport, modernising and developing rail, and promoting cycling. Growth in electromobility will be supported by the expansion of charging infrastructure, the uptake of electric and plug-in hybrid vehicles, clean vehicle requirements in public procurement, and the use of agricultural bio-components. Intelligent transport systems are also expected to play a complementary role.

Industry, responsible for about one quarter of total energy consumption in the EU, is recognised as a priority area for emission reductions. In Poland, high energy intensity and associated costs significantly affect competitiveness, while increasing investor expectations regarding environmental standards intensify the pressure for transformation. Decarbonisation strategies must reflect sector-specific characteristics. In industries such as cement, steel, chemicals, and fertilisers, not only energy-related but also process emissions remain a critical challenge, as they arise directly from raw material processing. Key drivers of transformation include improving energy efficiency and scaling up zero-emission energy sources.

While biomass has so far been the primary renewable source in industry, future progress will increasingly rely on biomethane, wind, solar energy, and green hydrogen. NECP projections suggest that by 2030 renewables could account for 23.7% of industrial energy use, rising to around 42.2% by 2040. Green hydrogen is expected to play a strategic role, supported by Poland's Hydrogen Development Strategy announced in September 2024 (Council of Ministers of the Republic of Poland, 2021). Poland is currently one of the EU's largest producers of grey hydrogen from natural gas; replacing it with its green equivalent will require significant financial and organisational effort. Offshore wind energy is identified as a main source for green hydrogen production, alongside municipal waste, biomass, and potentially nuclear energy after 2030.

To reduce process emissions in hard-to-abate industries, CCS and CCU technologies are also considered. Their deployment could support decarbonisation in the cement, steel, and chemical sectors. In Poland, this area is still at an early stage of development. A letter of intent signed in March 2025 between the Ministry of Climate and Environment, industry, academia, and NGOs initiated preparatory work to assess the potential of CCS/CCU (Ministry of Climate and Environment, 2025). The feasibility of these technologies will depend on reliable assessments of storage capacity, transport options, and capture volumes, which are to be further developed within the forthcoming national CO_2 management strategy.

3.3.2. Energy efficiency

Energy efficiency improvement is one of the central points of the NECP, as reducing energy needs supports achieving goals in other areas of the energy transition. According to the EED directive, the indicative target for Poland is a 14.4% and 12.8% reduction in primary and final energy consumption, respectively (Table 3). Poland declares taking on this challenge, but forecasts in the WAM scenario indicate the possibility of achieving over 4% reduction in final and over 13% reduction in primary energy consumption.

Table 3. Poland's energy efficiency targets.

Category	NECP (2019)	NECP (2025)		Target for Poland
		WEM	WAM	
Primary energy consumption	+5.9% (in 2030 vs 2020)	-8.9%	-13.5%	according to the EED formula: -14.4% vs. PRIMES 2020*
Final energy consumption	+7.2 (in 2030 vs 2020)	-0.6%	-4.2%	according to the EED formula: -12.8% vs. PRIMES 2020

*PRIMES (Price-Induced Market Equilibrium System) is a partial equilibrium energy–economy model used by the European Commission to assess the impacts of EU climate and energy policies. It simulates energy demand and supply, technology choices, system costs, and greenhouse gas emissions under alternative policy and price assumptions.

Source: Own elaboration based on NECP (2019 and 2025 update).

By contrast, the WEM scenario falls significantly short of these targets, indicating that achieving deeper reductions by 2030 remains extremely challenging despite ongoing policy efforts. The potential for easy savings has already been largely exhausted, and further improvements will require time, investment, and systemic coordination. Nevertheless, the government continues to prioritise energy efficiency as one of the key pillars of

national energy and climate policy, guided by the principle of "energy efficiency first." This approach calls for planning and implementing new investments in a way that ensures only the necessary amount of energy is produced and consumed, using solutions that are technically feasible, economically justified, and environmentally sound.

The WAM scenario outlines a comprehensive package of additional measures, particularly in the building sector. These include expanding thermal modernisation programmes, accelerating digitalisation, and implementing advanced control systems for heating in residential and service buildings. The potential for improvement is substantial – currently, only 47% of Polish households have radiator thermostats for basic temperature regulation, while just 3% use advanced thermostats enabling room-by-room control. The implementation of these measures is expected to help rationalise household energy use, improve living standards, and reduce energy poverty. It is estimated that at least half of Polish households could achieve around a 10% reduction in energy consumption, which is particularly important for vulnerable consumers and residents of social housing.

Energy efficiency is recognised as a cross-sectoral priority, with key areas of action identified for all parts of the economy. In industry and services, actions focus on reducing energy intensity through energy management systems, heat recovery, energy audits, and replacing outdated technologies with more efficient or zero-emission solutions. In transport, the focus lies on developing intelligent transport systems, promoting energy-efficient driving, expanding public transport, and modernising vehicle fleets with higher-efficiency and zero-emission vehicles. The energy generation and supply sectors will prioritise decentralised production, high-efficiency cogeneration, local energy sources, and efficient distribution of heat, cold, and electricity, including the deployment of low-temperature networks. The public sector is expected to lead by example, integrating energy efficiency criteria into public procurement, applying performance-based contracting, and demonstrating best practices across its operations.

Enhancing energy efficiency remains the most cost-effective and cross-cutting instrument for advancing Poland's energy transition. By reducing overall energy demand, it supports emission reduction across all sectors while improving energy security, lowering costs for households and enterprises, and fostering technological modernisation. Sustained policy focus and investment in this area will therefore be essential to ensuring that the transition proceeds in an economically and socially balanced manner.

3.3.3. Energy security

From a national perspective, energy security is the fundamental precondition for achieving all objectives of the energy transition. Strengthening energy independence has become a strategic priority, particularly in the context a crisis triggered by the war in Ukraine. While progress toward climate neutrality requires a gradual phase-out of fossil fuels, maintaining reliable supplies of gas and oil and safeguarding system stability during the transition period remain essential for overall resilience.

Phasing out coal

In relation to the coal demand, Poland aims to meet its domestic needs primarily through national resources. Due to their physical and chemical characteristics, domestic coal reserves are mainly used in the power sector. Consequently, the NECP assumes that the reduction in coal consumption must be synchronized with the construction of new generation sources and the deployment of energy storage solutions. Forecasts indicate that domestic consumption of hard coal for energy purposes will not exceed 22.5 million tonnes in 2030, compared to 43 million tonnes in 2020. After 2030, this process is expected to accelerate, with the complete phase-out of hard coal mining projected no later than 2049. The decline in production will correspond with reduced coal demand across all economic sectors, particularly in electricity and heat generation and in industry.

The expansion of domestic zero-emission generation capacity will require additional dispatchable sources, including the planned development of nuclear power. In terms of import dependency, the deployment of this technology requires securing a stable supply of nuclear fuel. Although Poland does not currently possess uranium deposits of commercially viable scale, the global market provides reliable supply opportunities. The NECP therefore assumes that access to fuel will not constrain the pace of nuclear energy development and that prices will remain relatively stable.

A key challenge remains the phase-out of coal use in households and among small-scale consumers. At present, household demand is largely met through imported coal. As part of air quality improvement and anti-smog policies, inefficient household coal boilers will be gradually replaced with zero- or low-emission heating systems. These actions, alongside the replacement of heat sources, will also involve thermal modernization and energy efficiency improvements in residential buildings.

Securing natural gas and oil supply

The energy market crisis of 2021–2022 clearly demonstrated the critical importance of ensuring sufficiently diversified fuel supplies. In this respect, Poland's position regarding natural gas was significantly stronger than that of many other European countries. Key infrastructure investments, including the LNG terminal in Świnoujście and the Baltic Pipe, were completed in time to allow the non-renewal of the long-term contract with the Russian company Gazprom.

Poland is also almost entirely dependent on oil imports from non-EU countries. The domestic sectors with the highest oil consumption are transport and industry, accounting for 82% and 16% of total final oil consumption, respectively. In 2023, Poland completely replaced Russian oil with imports from Saudi Arabia and Norway. The updated NECP includes investments to increase the capacity of transmission infrastructure and ensure an alternative supply route to refineries in eastern Germany. These measures are essential, as despite the downward trend in overall import dependency, progress in reducing reliance on these fuels remains gradual.

In terms of gas, particular emphasis is placed on the creation of the Nordic–Baltic Hydrogen Corridor, which will support regional cooperation in clean fuel technologies. Additionally, Poland plans to commission a Floating Storage and Regasification Unit (FSRU) terminal in the Gulf of Gdańsk by 2027–2028. These investments not only enhance national energy security but also expand Poland's role as a regional hub for gas transmission and trade.

An increasingly important component of Poland's gas transition is the development of biomethane, which can be blended with natural gas and transported through existing gas networks. Biomethane can also be stored long-term within the gas system and, together with natural gas, used in gas-fired peak units during periods of insufficient solar and wind generation. As a renewable fuel, it plays a dual role – supporting both system flexibility and the gradual decarbonization of the gas sector. By 2030, Poland aims to achieve domestic biomethane production of approximately 1.5 billion m^3, increasing to around 3.9 billion m^3 by 2040. In the long term, this level of output is expected to enable the country to meet its gas fuel demand through a combination of domestically produced biomethane and natural gas, thereby strengthening energy independence and contributing to the decarbonization of the national gas system.

Poland will continue its current fuel security policy. The NECP identifies the development of infrastructure as a key element of this approach. Efforts will focus on maintaining efficient logistical links with neighbouring countries (Germany, the Czech Republic, Slovakia, Ukraine, and Lithuania) as well as with maritime fuel terminals. The plan foresees the modernization and expansion of transhipment capacity at ports in Szczecin, Świnoujście, Gdańsk, and Gdynia, as well as the enlargement of national fuel storage facilities. Additional measures include extending the Central European Pipeline System (CEPS) into Poland and regularly assessing market needs for crude oil and fuel storage capacity.

Development of transmission and distribution infrastructure

A well-developed and efficiently managed electricity transmission and distribution infrastructure is a key component of Poland's power system security. Equally important is the ongoing shift from a centralized to a more decentralized model of energy generation, which requires increased system flexibility and new management solutions.

The development of transmission and distribution networks remains a strategic priority for ensuring the reliability and adaptability of the Polish power system during the energy transition. Up to 2035, the main activities will focus on several key objectives: integrating offshore wind farms in the Baltic Sea, preparing grid connections for planned nuclear power plants, strengthening north–south transmission capacity, and improving supply reliability. Additional investment priorities include connecting new consumers and generation units, including renewable and low-emission sources, as well as energy storage facilities. These projects will

also facilitate the broader transformation of the energy sector, supporting the expansion of electromobility, the hydrogen economy, prosumer initiatives, and local energy communities.

Most transmission investments have multiple benefits, as projects designed to integrate offshore wind and nuclear power will simultaneously enhance supply reliability and system stability in northern regions. Several initiatives will also expand cross-border interconnections and electricity exchange capacity, contributing to the integration of regional energy markets.

At the distribution level, efforts will concentrate on enhancing system flexibility, expanding networks to accommodate renewable sources and storage facilities, and supporting the electrification of transport and other sectors. Key priorities include the gradual replacement of overhead medium-voltage networks with underground cable systems, accelerating digitalization and automation, and deploying smart grid technologies such as advanced metering infrastructure. The overarching goal is to ensure a reliable, high-quality electricity supply for all consumers while enabling the efficient integration of distributed generation.

3.3.4. Internal market integration

Ensuring energy security requires the development of interconnections that enhance system stability and resilience. Within the European Union, cross-border flows primarily involve natural gas, crude oil, and electricity. The effectiveness of these exchanges depends on two complementary factors: well-developed and efficiently managed domestic infrastructure (transmission networks and storage facilities) and cross-border interconnections. Both dimensions – internal and external – are mutually reinforcing and strengthen resilience to potential crises. Therefore, selected projects that improve national grid capacity or eliminate bottlenecks are recognized as Projects of Common Interest (PCI) under EU regulations.

Poland aims to increase the use of cross-border transmission capacities and advance the integration of its power system with neighbouring countries. In February 2025, the electricity systems of the Baltic States (Lithuania, Latvia, and Estonia) were synchronised with the Continental Europe area through the Polish transmission network. A second interconnection, planned for completion by 2030, will further enhance the security and efficiency of synchronous operation of the Baltic systems. These developments significantly strengthen the operational stability of the regional power system and improve the overall resilience of the Baltic region.

At the same time, in 2022, the electricity systems of Ukraine and Moldova were connected to the Continental Europe synchronous area under emergency mode. This step enabled technical support for power balancing and increased regional security of supply during the war, while accelerating the long-term process of integrating the Ukrainian system into the European electricity market.

In the gas sector, following the expansion of the LNG terminal in Świnoujście (to 8.3 billion cubic metres (bcm) capacity) in 2025 and the commissioning of the Floating Storage and Regasification Unit (FSRU) terminal in the Gulf of Gdańsk in 2027–2028 (6.1 bcm), no additional projects increasing import or export capacities are foreseen. However, domestic infrastructure investments will continue to ensure the efficiency of gas transmission and intersystem exchange, and to prepare the network for the future transport of non-fossil gases. Total import capacity will reach approximately 42 bcm, while export capacity will amount to nearly 12 bcm.

The gradual reinforcement of electricity and gas interconnections strengthens Poland's role as a regional hub within Central and Eastern Europe. The expansion of cross-border energy infrastructure strengthens regional integration and supports the diversification and flexibility of Poland's energy system. By improving interconnections for electricity and gas, Poland enhances both national and regional resilience while contributing to the objectives of the EU internal energy market.

3.3.5. Research and development

Through coordinated research, innovation, and financing policies, Poland aims to create a system that drives technological modernization and green growth. Research and development is presented as an enabling condition for delivering the NECP's decarbonisation pathway and for strengthening industrial competitiveness. The plan identifies a wide range of priority areas, including energy efficiency in industry and buildings, low- and

zero-emission transport, industrial decarbonization technologies, energy storage, renewable energy, and the digitalization of the energy system through smart grids and data-driven management. It also places emphasis on strengthening domestic capabilities and supply chains ("local content") for low- and zero-emission technologies and key system components. These priorities are broadly consistent with Energy Union objectives, but they are formulated at a high level or as strategic aspirations – for example, developing domestic manufacturing capacity for selected components (such as PV, batteries, heat pumps and hydrogen technologies) and supporting pilot and demonstration projects. The NECP does not set out a prioritized technology roadmap that would allow progress on clean-energy innovation and deployment to be tracked over time.

On funding, Poland intends to increase overall national expenditure on research and development. The plan sets an overarching national ambition to increase R&D expenditure from around 1% of GDP in recent years to 2.5% by 2030, and outlines a financing landscape by listing several instruments that can support relevant innovation. This includes, among others, the FENG programme (with support for R&D, business innovation, digital transformation and the green economy), competitive participation in Horizon Europe, and selected national vehicles such as NCBR's strategic programme "New Technologies in Energy" and PFR Green Hub. At the same time, the NECP does not specify a dedicated clean-energy R&I funding target, nor does it provide a quantified technology-oriented allocation of R&I resources. The plan also notes that, in many cases, financing will require further structuring and detailed planning during implementation, which limits the ability to assess funding adequacy against the scale of the accelerated (WAM) pathway.

3.4. Just transition and socio-economic impact

In line with the NECP framework, the plan discusses not only decarbonisation measures but also their socio-economic implications, including distributional effects across households and regions and the need for a just transition. This is particularly relevant for Poland given the scale of the coal sector and the concentration of fossil-fuel activities in specific regions. The transition toward a low-emission economy will generate significant long-term benefits, including lower energy production costs, modernization of the national economy, improved quality of life, and reduced environmental externalities. However, as a systemic economic and energy transformation, it also entails a range of distributive effects that may lead to new income and regional inequalities. Maintaining social and economic balance during this process requires a transition pathway that minimizes adverse impacts on vulnerable groups while maximizing benefits for all citizens. Effective monitoring and policy coordination will therefore be crucial to managing these impacts and ensuring that the transition remains both economically and socially sustainable. Although the extraction and large-scale processing of fossil fuels – natural gas, crude oil, and coal – take place in several regions of Poland, the transition will have the most profound impact on coal-mining areas, as coal is expected to decline fastest among all fossil fuels in the coming years.

3.4.1. Coal-dependent regions

Several Polish regions remain highly dependent on activities linked to coal, including extraction and coal-related value chains, which makes the planning and support of coal regions a priority in the NECP. The Plan frames a just transition as a coordinated process that should reflect local conditions and mitigate negative social and economic impacts while enabling new development opportunities. It links support for coal regions to EU rules requiring territorial just transition planning for eligible subregions and explains that support is provided across five voivodeships on the basis of four Territorial Just Transition Plans.

The NECP emphasises that measures should combine social protection with the creation of new regional specialisations and durable jobs, supported by actions such as investment incentives, reskilling and training, and stronger coordination between public institutions and employers. Economic diversification priorities include renewables, energy storage, hydrogen and alternative fuels, electromobility, and the digitalisation of the economy and energy system, alongside measures that can also support climate adaptation and air quality improvements.

The primary financial instrument supporting the transformation is the Just Transition Fund (JTF), with an allocation of EUR 3.85 billion, complemented by national co-financing of PLN 0.93 billion. The Fund supports

local economic diversification, SME development, employee reskilling, post-mining land rehabilitation, and the advancement of the green and circular economy. Planned measures include investment incentives, the creation of new industrial branches, worker support and retraining centres, as well as education and public consultation initiatives. Through coordinated use of the Just Transition Fund and Territorial Plans, Poland seeks to ensure that the decarbonization process contributes to inclusive regional development, reduces inequalities, and creates a sustainable socio-economic model for post-coal regions.

3.4.2. Energy poverty

Households represent one of the social groups most vulnerable to the risks associated with rising energy costs. In line with the national definition in the Energy Law, energy poverty refers to a situation in which a household is unable to secure an adequate level of heating, cooling, lighting and electricity for appliances. The NECP describes energy poverty as a complex social, technical and economic phenomenon and links it to (i) high energy expenditures, (ii) low incomes, and (iii) low energy performance of buildings. The NECP emphasizes that there is a risk of deepening energy poverty and that protecting households for whom transition costs are excessively high is one of the key priorities of the plan.

The national policy objective is to ensure a downward trend in energy poverty that does not exceed the EU average by 2035. The NECP also highlights the need to protect vulnerable households from the distributional impacts of the introduction of EU ETS-2 and to reduce the risk of an increase in energy poverty due to ETS-2.

To track the scale of the challenge, the NECP refers to national statistical indicators (including GUS-based measures such as LIHC and 2M) and also discusses the approach introduced under the revised Energy Efficiency Directive (EED), which builds on an average of four component indicators and uses 2019 as a reference year.

In terms of instruments, the NECP stresses close alignment with the Social Climate Fund and the national Social Climate Plan, which is intended to combine investment support and (where relevant) direct income support to mitigate impacts on vulnerable households. Beyond short-term protective measures, the plan points to structural investments – particularly improvements in building energy performance and replacement of outdated heating systems, including support for renewable and zero-emission heating solutions, often combined with energy and heat storage.

Finally, the NECP outlines steps to strengthen targeting and monitoring, including (i) a review of the legal definition, diagnosis and monitoring of energy poverty, and preparation of legal/administrative/financial support instruments, as well as (ii) improvements to GUS household energy-use statistics to provide better data for monitoring energy poverty.

Building a sustainable and well-targeted support system for vulnerable households is essential to ensuring that the energy transition remains inclusive and socially acceptable. Reducing energy poverty will simultaneously enhance living standards, strengthen social cohesion, and contribute to the overall success of Poland's low-emission transition.

3.4.3. Transport poverty

The updated NECP also addresses the challenge of transport poverty, defined as difficulties faced by individuals and households in accessing private or public transport, including the ability to cover its costs, which can limit access to basic services and participation in socio-economic life. The Plan links the phenomenon to uneven development of transport infrastructure and services and notes that it is particularly visible in smaller towns and rural areas, where the liquidation of bus routes, closure of rail stops and lack of alternatives contribute to transport exclusion and greater dependence on private cars. It also highlights barriers such as high ticket prices, lack of connections, infrequent services or poorly coordinated schedules.

The policy objective is framed as ensuring transport accessibility for residents and counteracting transport exclusion. Measures focus on increasing the availability and attractiveness of public transport, including restoring discontinued bus connections, investing in modern bus fleet and stop infrastructure in municipalities affected or at risk of transport poverty, and modernising and expanding rail infrastructure and services.

Complementary actions include support for active mobility infrastructure (cycling and walking) and shared/on-demand mobility solutions.

Efforts to reduce transport poverty are intended not only to improve accessibility and quality of life but also to align social policy with climate and energy objectives. The NECP assigns a significant role to the Social Climate Fund, to be implemented through the national Social Climate Plan, with actions targeted spatially to areas affected or threatened by transport poverty and aimed at limiting the negative impact of ETS-2. Such support may include investments that improve access to public transport and enable the uptake of low-emission mobility options.

4. Social preferences and public acceptance

As it was demonstrated in the previous sections, the energy transition will be one of the key drivers of Poland's economic and social development. How this process unfolds will depend not only on technological and economic conditions, but also on levels of social trust, perceptions of risk, attitudes towards climate change, and views on the fair distribution of costs and benefits. Public acceptance of these changes is shaped by the degree to which public policies align with the expectations, norms and interests of different social groups, as well as by assessments of how institutions perform and by people's sense of individual agency and of their own position within the balance of costs and benefits. It is therefore increasingly important to understand how citizens evaluate the actions taken in this area and which directions of public policy they regard as most justified.

In recent years, households in Poland have experienced rising energy costs, uncertainty linked to the geopolitical situation, and increasing economic pressure. Under these conditions, opinions on the energy transition and climate action are particularly sensitive to concerns about security, costs, and the perceived fairness of how burdens are shared. This applies both to perceptions of the role of specific institutions and to assessments of different social groups, which may participate to a greater or lesser extent in the effort to reduce emissions.

To understand which attitudes are most prevalent in society, it is necessary to examine both stated opinions and the actual preferences people reveal when they are asked to make concrete choices. For this reason, the study presented in this section combines two complementary components. The first is a survey module that captures people's concerns, beliefs and evaluations related to energy and climate. This allows us to describe the broader social context in which households operate. The second component is a Discrete Choice Experiment (DCE) – a research method that makes it possible to identify which public policy solutions citizens prefer when they have to choose between different features of a given measure, such as its cost, the scope of its benefits or its climate impacts.

Using a DCE enables us to analyse the trade-offs that respondents are willing to make and to estimate the relative importance they attach to different policy attributes. As a result, we obtain information not only about support for particular measures, but also about the strength of these preferences. This, in turn, makes it possible to identify which elements of the energy transition are likely to enjoy high levels of public acceptance and which may trigger resistance or doubts.

The aim of this section is to present the study's findings in a way that helps to clarify the social conditions shaping the energy transition in Poland. We combine the analysis of survey responses with the findings from the experiment in order to show both what people in Poland think about climate action and which specific policy measures they choose when they are required to make compromises. The section ends with recommendations that may be useful for public institutions, local governments and organisations involved in designing climate and energy policies.

4.1. How do we measure social preferences?

The study was carried out on a representative sample of the adult population living in Poland. Respondents were recruited through an online panel with a controlled demographic structure. Representativeness was ensured with respect to age, gender, level of education and place of residence (urban or rural). The data were

weighted so that their structure corresponds to official statistics for Poland's adult population. In total, 3,750 respondents completed the questionnaire. The fieldwork was conducted in September 2025, which situates the findings in the current context of debates on climate policy and discussions surrounding the NECP update.

The study used the method of a Discrete Choice Experiment (DCE). This approach makes it possible to estimate preferences for different characteristics of policy scenarios and to determine how much importance respondents attach to each element of a proposed solution (Hainmueller et al., 2014).

The experiment included four key policy attributes:

1. The impacts of climate change,
2. The level of fossil fuel imports,
3. The distribution of costs associated with implementing a given policy option,
4. The distribution of benefits resulting from implementing a given policy option.

The attributes were selected to reflect the core dilemmas of energy and climate policy: the balance between costs, security, fairness and effectiveness. Preferences were estimated using a logit model grounded in random utility theory (McFadden, 1974). The parameters for each attribute indicate how strongly a given policy characteristic increases or decreases the likelihood of it being chosen. On this basis, we also calculated the Willingness to Pay (WTP) – the relative value that respondents assign to individual policy features in comparison with their cost.

The Willingness to Pay (WTP) values estimated in the experiment should not be understood as the exact amounts that respondents would actually pay. WTP is a measure of the value participants attach to a given change or policy outcome, rather than a statement about real expenditure. Because the choices in the experiment are hypothetical, they do not fully take into account all the constraints that apply to real financial decisions – such as the available household budget, attitudes to risk, or the psychological "pain of paying". WTP should therefore be interpreted as an economic measure of preferences, indicating how much value respondents place on a given policy feature relative to its cost, rather than how much an average respondent would realistically pay.

As with any research method, certain limitations need to be borne in mind when interpreting the results. In the case of DCEs, a key issue is that they are based on hypothetical scenarios, which means that stated choices may differ from actual behaviour in markets or in the political sphere. Respondents may, for example, simplify the task, consistently prefer the status quo regardless of the content of the scenarios, or experience fatigue, all of which can affect the quality of their answers. The results also depend on how attributes and their levels are defined, which may lead to either overestimation or underestimation of WTP. In addition, the statistical models used assume a particular structure of preferences that does not always fully reflect the complexity of human decision-making. For these reasons, DCE results should be treated as estimates of preferences rather than a direct representation of real-world behaviour.

Despite these limitations, the Discrete Choice Experiment (DCE) method has a number of important advantages that explain its widespread use in preference research. Above all, it makes it possible to analyse complex decisions in a way that resembles real-world choices, because respondents evaluate whole packages of attributes rather than isolated elements. DCE also allows researchers to estimate the value of individual attributes, including those that do not have a natural market dimension – such as environmental quality or the outcomes of public policies. The method identifies trade-offs, that is, what respondents are willing to give up in order to gain something else. A further advantage is the ability to model differences in preferences across groups and to predict reactions to new policy scenarios that do not yet exist in practice. For these reasons, DCE is a flexible and powerful tool for public policy assessment and design.

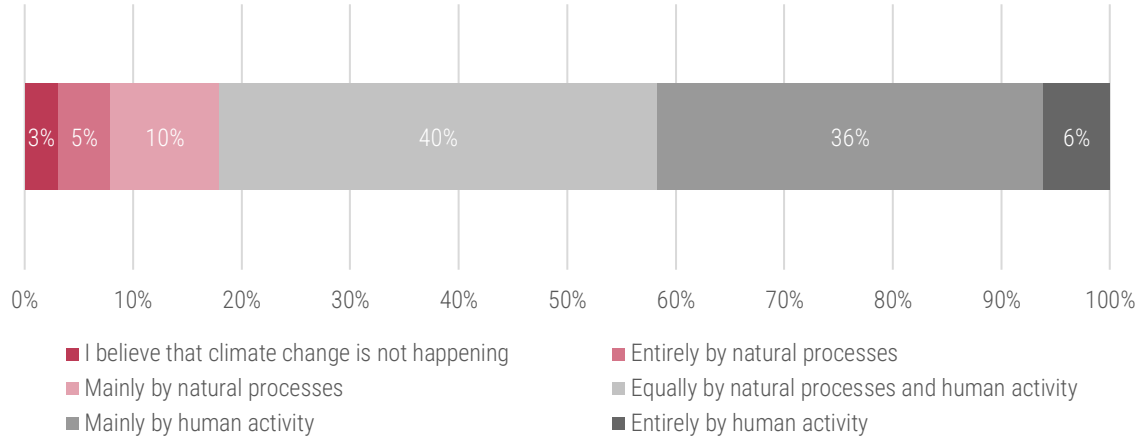
4.2. Assessing public preferences on climate and energy policy

4.2.1. Social concerns and attitudes towards the energy transition

In this part section, we present survey results that reconstruct the social context in which respondents evaluated climate and energy policies and made their choices in the discrete choice experiment. We highlight the main areas of concern, attitudes and assessments of institutions, which later serve as a reference point for interpreting the DCE results.

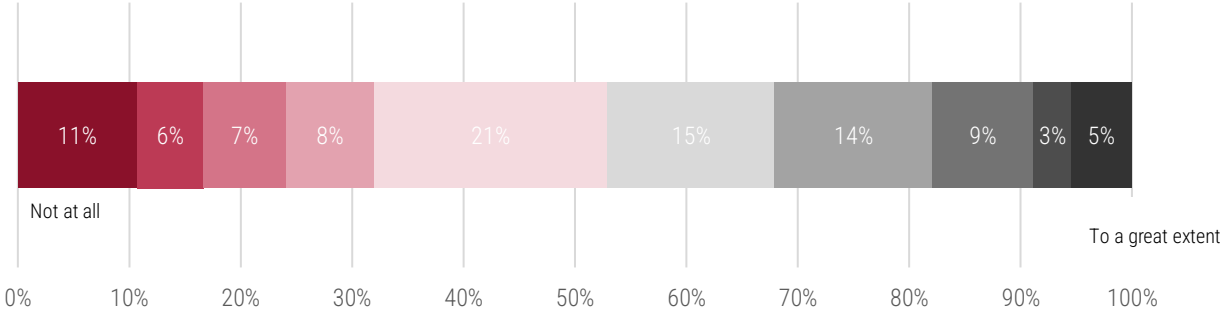
A majority of respondents (over 80%) agree that human activity has an impact on the climate (Figure 19). The share of people who completely reject any link between emissions and climate change is marginal (at 3%). This suggests that, within the surveyed population, the reality of the climate change is widely recognised and there is a general willingness to accept climate action as a justified response to this challenge. However, the sense of personal responsibility for taking action is moderate A large share of respondents (almost 60%) place themselves in the middle of the scale, indicating that they feel jointly responsible but do not see themselves as the main drivers of change. (Figure 20).

Figure 19. Perceived causes of climate change (survey responses)



Source: Own elaboration based on survey data

Figure 20. Perceived personal responsibility for limiting climate change

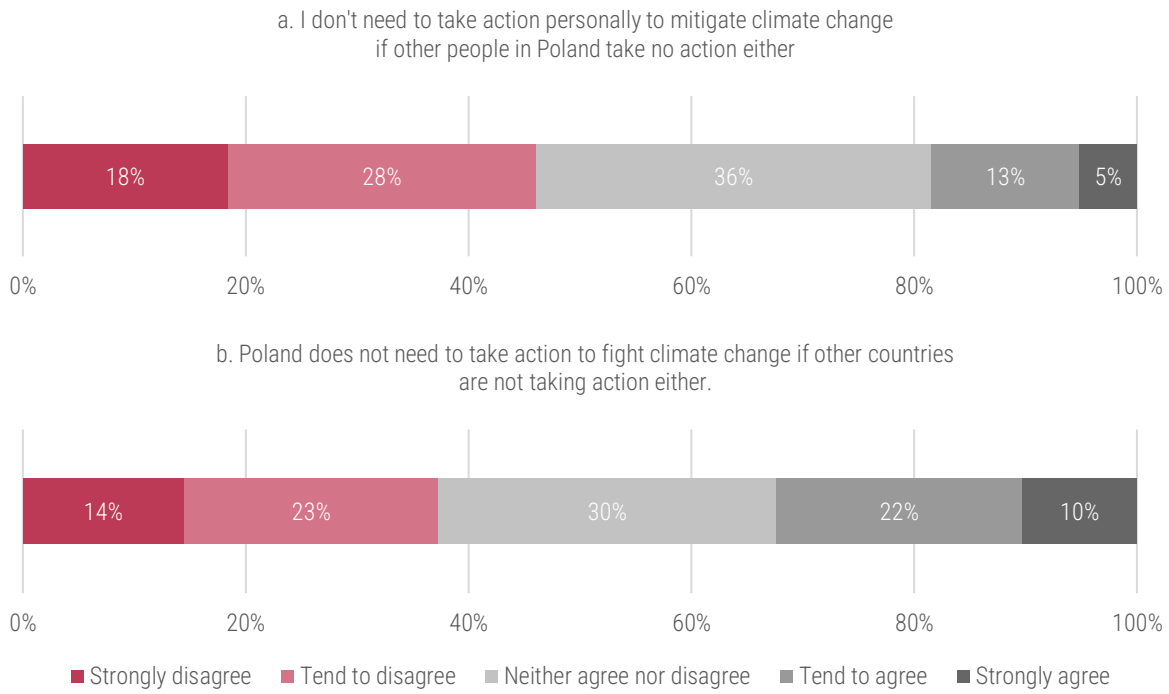


Source: Own elaboration based on survey data

The survey also asked whether people's willingness to engage in climate-friendly action depends on what other individuals and countries do. A majority of respondents disagreed with the statement that "there is no point in making an effort if others do not," although many answers clustered around the neutral midpoint of the scale. This pattern suggests a combination of a declared sense of responsibility and scepticism about the actual impact of individual actions (Figure 21a).

In the international context, opinions are more divided (Figure 21b). Some respondents believe that Poland should act regardless of what other countries do, but a substantial share considers climate action meaningful mainly when other countries also participate. This suggests that part of society sees climate policy as an area that requires cooperation and coordination, rather than relying solely on unilateral initiatives.

Figure 21. Attitudes towards inaction and conditional climate action

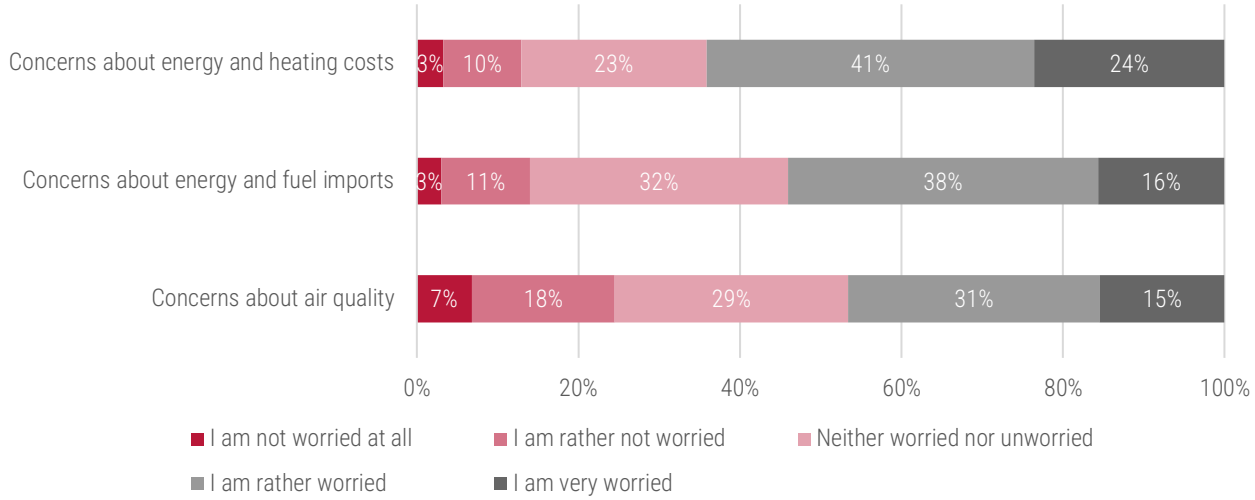


Source: Own elaboration based on survey data

Changes in the energy market are also a source of concern for respondents (Figure 22). The strongest worries relate to the cost of energy and heating. A large share of those surveyed report anxiety about rising bills, which they link to their recent experience of increasing energy prices and high inflation. For lower-income households, spending on energy can represent a significant share of the budget, so uncertainty about the level and volatility of these costs is a source of personal stress.

A second important area of concern is energy security, understood as reducing the dependence of the national energy system on imported fuels. These worries are clearly visible across all social groups, although their intensity varies depending on the type of heating used. At the same time, issues of air quality and the impacts of climate change are also recognised, but in the hierarchy of perceived risks they are ranked below financial and security-related concerns.

Figure 22. Levels of concern about air quality, energy imports and energy costs

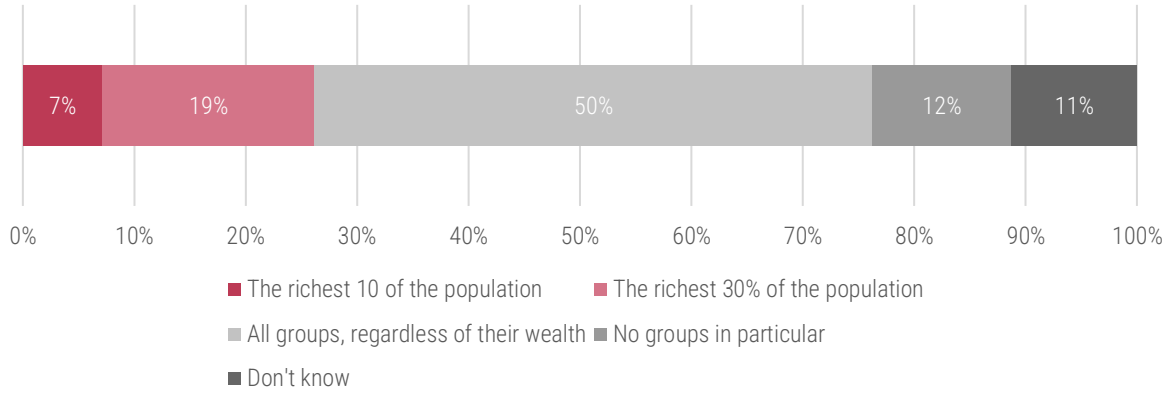


Source: Own elaboration based on survey data

When asked who should do more to reduce energy consumption and bear the costs of the transition, respondents expressed a view that can be described as moderately progressive. Some suggested that people with higher incomes should bear a greater share of the burden. At the same time, most respondents did not support shifting full responsibility onto a narrow group of the very richest (Figure 23).

Overall, there is an expectation of a proportional rather than a highly selective sharing of the effort: better-off households are expected to contribute more, but the transition is still seen as a shared project, not as a task that should rest solely on any single social group.

Figure 23. Social groups seen as most responsible for reducing energy use

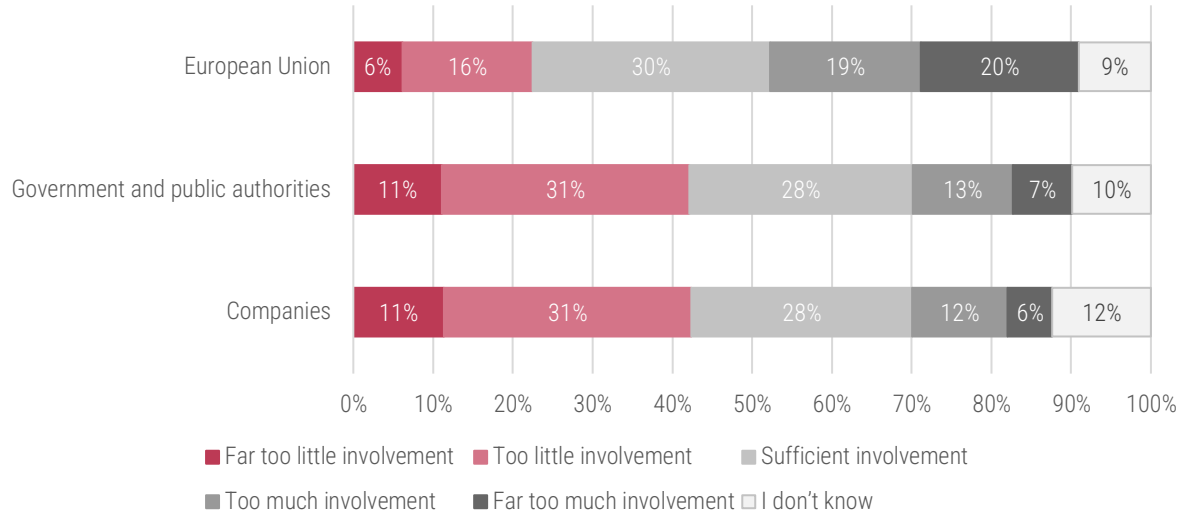


Source: Own elaboration based on survey data

Respondents clearly differentiate between institutions when assessing their engagement in climate and energy action. The European Union is most often seen as an actor that is doing a lot, or even "too much." In the case of national institutions – the government, local authorities and energy companies – respondents more often feel that current efforts are insufficient and should be stepped up (Figure 24).

This pattern of responses indicates that expectations regarding climate and energy policy are largely directed towards domestic institutions. It also creates an important context for how these policies are communicated to the public.

Figure 24. Social groups seen as most responsible for reducing energy use



Source: Own elaboration based on survey data

4.2.2. Preferences on climate and energy policy directions: results from the choice experiment

Reducing the impacts of climate change

Among all the policy attributes analysed, respondents clearly indicate that reducing the risks associated with climate change is their priority. They see such action as justified and necessary, and investments in adaptation and in limiting environmental risks have strong potential for public support.

Moving from a scenario with significant to one with minimal climate impacts is associated with the highest estimated WTP (around 120 euros of their monthly income). This parameter is statistically significant and clearly higher than for the other attributes. In practical terms, this means that people in Poland attach considerable importance to initiatives that increase resilience to extreme weather events, protect health and infrastructure, and reduce the risk of future losses.

When these results are compared with the descriptive survey findings, it becomes apparent that concerns about climate, health and living conditions translate into a very strong preference for policies that effectively reduce the impacts of climate change. Respondents appear to view such measures as particularly important for the future, for security and for quality of life, even when they involve additional costs.

Fossil fuel imports and energy security

The second most important policy attribute is the level of fossil fuel imports. Respondents clearly prefer scenarios that involve reducing imports of gas, oil and coal, which points to a strong public expectation of greater stability and resilience in the national energy system. The relatively high value attached to this attribute (around 41 euros) reflects a combination of factors: recent experience of fluctuating energy prices, awareness of dependence on external suppliers, and geopolitical concerns.

Reducing fossil fuel imports is therefore seen primarily as a way to strengthen control over the country's energy security. In light of the concerns described in the previous section – about both energy prices and security of supply – this result can be interpreted as an expectation that the energy system should become more stable and secure. It emerges as an important policy attribute and, from the perspective of the model, we can conclude that lower fossil fuel imports significantly increase the attractiveness of a given policy scenario.

Preferred distribution of transition costs

A key part of the analysis examines who should contribute more to the costs of the energy transition. The results show that the public prefers a moderately progressive arrangement, with the top 30% of earners covering a larger share of the costs. For this option, we obtain a positive and statistically significant WTP of around €13.

This suggests that respondents are willing to accept a moderately progressive contribution scheme, spread across a broader group of higher-income households, and is consistent with the survey findings, where many respondents assigned greater responsibility to better-off groups. By contrast, when a higher share of the costs is assigned solely to the richest 10%, the estimated WTP is small and not statistically significant, indicating no clear preference for this option: respondents do not see it as substantially better or worse than an equal cost-sharing scheme.

Overall, respondents favour a solidaristic but not extreme approach. A moderate level of progressivity is acceptable, whereas highly selective arrangements are perceived as less fair. This is an important signal for the design of public financing mechanisms: broad-based progressivity can be socially acceptable, but only up to a certain point.

The DCE data do not allow us to determine whether this preference is driven mainly by egalitarian motives, a sense of fairness or a pragmatic assessment of the financial capacity of different groups. They do, however, clearly show that a moderately progressive distribution of costs increases policy acceptance, while solutions focusing on a very narrow group do not generate additional support.

Preferred distribution of policy benefits

The way in which the benefits of climate and energy policy are distributed is one of the key factors shaping public preferences. In contrast to their support for a moderately progressive distribution of costs, respondents are clearly reluctant to endorse options that direct the positive effects of policy only to narrow groups of beneficiaries. In the model, this is a very strong effect.

These findings suggest that respondents expect the positive effects of the transition – such as improved air quality, greater energy security and more stable prices in the longer term – to be felt broadly across society. Programmes targeted exclusively at the less affluent households, while they may have a strong social rationale, are not viewed as delivering broad distributive fairness. The data do not indicate whether this negative assessment stems from a lack of identification with the beneficiary group, a sense that the majority is being left out, or other factors; they do, however, clearly show that broad access to the benefits of the transition is crucial for policy acceptance.

4.3. Implications for policy design and communication

The study shows a consistent pattern in public preferences on climate and energy policy in Poland. People place the highest value on measures that reduce the impacts of climate change and cut fossil fuel imports. They are willing to accept a moderately progressive distribution of costs, shared across a broader group of higher-income households, but clearly do not favour scenarios in which the benefits of policy are confined to a narrow group of the poorest.

These findings are in line with the descriptive survey results. In that part of the study, worries about energy costs and security of supply come to the fore, alongside an expectation that the effort should be shared in a solidaristic but proportionate way. The experiment therefore provides a solid basis for formulating public policy recommendations. It illustrates how measures related to the energy transition can be designed and communicated to build broad public support. In summary, effective policies should rest on three pillars: security, proportionality and widely shared benefits.

Aligning climate goals with energy security

Public concerns and preferences point to a strong demand for security and stability. Respondents are most worried about energy prices and the reliability of supply, but they also support policies that reduce the impacts of climate change and lower dependence on imported fossil fuels. Taken together, the results suggest that policies are most likely to gain public support when climate and energy-security objectives are pursued jointly.

For specific instruments – such as support schemes for renewables, grid modernisation or energy-efficiency programmes – it is therefore important to communicate and document not only their contribution to emission reductions, but also their role in strengthening security of supply and increasing the resilience of the energy system. Policies that can credibly be shown to deliver on both dimensions appear to enjoy the strongest social backing. Communication can build on this by clearly linking such measures with energy security and stability, and by showing tangible effects for households, such as reduced exposure to price shocks, lower risk of supply disruptions and greater predictability in the medium and long term.

Fair distribution as a central theme

The study also shows that perceptions of fairness are central to public acceptance. People are generally willing to accept a moderately progressive distribution of costs, in which a broader group of higher-income households contributes more, but they attach great importance to the benefits of the transition being widely shared. Policies are better received when citizens feel that the effort is distributed in a proportional and transparent way, rather than concentrated on a narrowly defined group.

Both the DCE results and the survey data indicate that people accept a greater financial contribution from higher-income groups, provided that the entire burden is not shifted onto a very small segment of the population. In practical terms, this suggests that financial mechanisms such as taxes, charges or levies can incorporate progressive elements, but should avoid framing a small group as the sole "payer" for the transition. Instruments that combine broad participation with a somewhat higher contribution from better-off households are more consistent with public expectations and are likely to be more sustainable politically.

A further important insight concerns the distribution of benefits. Policies focused exclusively on a single group have limited potential for broad support. This does not mean that targeted assistance for households in difficult situations is unwelcome; rather, such programmes are better received when they are embedded in a wider package of measures. Alongside selective transfers, it is helpful to include universal components whose benefits are visible to the majority of households – for example improved air quality, a more secure energy system or more stable prices. Policies that combine targeted support with clearly communicated, broadly shared benefits are more likely to be seen as fair and to attract lasting public backing.

The role of national institutions and cooperation with the EU

Finally, the findings highlight the importance of how the roles of national institutions and the European Union are presented. Respondents expect the government, local authorities and domestic energy companies to be actively involved in managing the transition, while their views on EU action are more mixed. This suggests that communication should avoid narratives in which climate and energy policies are portrayed merely as obligations imposed from outside. Instead, it is useful to emphasise how national decisions fit within a broader European framework, and to show that domestic actors retain real agency in designing and implementing solutions. Clear information on which elements of policy are shaped at national level, and what specific benefits they bring to local communities, can strengthen the sense that the transition is a shared national project carried out in cooperation with European partners, rather than something happening "to" the country from the outside.

5. Integrated assessment

The updated National Energy and Climate Plan (NECP) presents the comprehensive vision of Poland's energy transition. It sets emission reduction targets, outlines the expansion of renewable energy, describes infrastructure modernisation, and defines measures to support households and regions most affected by the transition. At the same time, the Energy and Climate Security Risk Index (ECSRI) reveals structural weaknesses in the Polish energy system – including high energy costs, dependence on fossil fuels, low energy efficiency in buildings and limited flexibility of critical infrastructure.

Seen together, these two perspectives raise a key question: how do the ambitions of the NECP measure up when viewed through the lens of risk? In other words, is the NECP not only aligned with EU climate goals, but also effective as a response to real threats to energy security, economic stability and social resilience? This

section addresses that question by examining whether planned policies mitigate the main risks identified in the analysis – and, where they do not, by indicating gaps that call for targeted intervention.

5.1. Consistency of NECP ambitions with the risk profile

The risk analysis is structured around four analytical categories of risk: geopolitical, affordability, reliability, and sustainability risks. Each of these evolves at a different pace and is driven by different factors. This makes it difficult to design a single, uniform policy response. Against this background, the NECP should be assessed in two ways:

1. as a strategy to address short- and medium-term risks, and
2. as a plan to reduce structural vulnerabilities of the energy system.

Overall, the updated NECP clearly addresses several key threats, particularly those related to import dependence, the low diversification of the energy mix, and the need to provide investors with predictable policy signals. At the same time, its ambitions remain more limited in areas where risks are primarily social and demand-driven – especially with regard to energy poverty, low building efficiency and the trend of rising energy costs for households and businesses.

5.1.1. Geopolitical risks and the NECP: strong alignment and continued risk reduction

The evolution of the geopolitical risk index indicates that Poland's most significant achievement in recent years has been a notable reduction in this dimension of risk. The shift away from Russian fuels, together with the expansion of import infrastructure, has significantly changed the country's exposure to external shocks. The NECP both reflects and reinforces this change.

Planned measures include:

- expanding domestic zero-emission generation (RES and nuclear), which reduces dependence on imported fossil fuels and the vulnerability to global price and political shocks;
- further developing gas infrastructure and LNG terminals, in line with ECSRI's diagnosis that greater flexibility and diversified routes are essential for secure supply;
- introducing biomethane and, at a later stage, hydrogen as fuels that can gradually replace natural gas in sensitive sectors, thereby reducing future reliance on pipeline imports;
- advancing integration with the EU electricity market, for example through synchronization of the Baltic States and the development of cross-border interconnectors, which strengthens regional system resilience.

From a geopolitical risk perspective, the updated NECP is therefore coherent and largely sufficient. It also preserves an important guiding principle: replacing one set of external dependencies (e.g. on Russian gas and coal) must not create new long-term vulnerabilities (for example, reliance on a narrow group of LNG suppliers). Ambitions set out in the plan not only consolidate the risk reduction achieved so far, but also create the conditions for a permanent – rather than temporary – decoupling from fossil fuel imports.

5.1.2. Affordability risks: the biggest gap between ambition and need

In the affordability dimension, the analysis is clear: this is currently the most acute component of energy-climate risk in Poland. High prices of energy carriers, structural dependence on coal in electricity and heat production, and poor energy performance of buildings put strong pressure on household budgets and business costs. The main sources of this risk are:

- high reliance on fossil fuels,
- rising CO_2 prices under the EU Emissions Trading System,

- low efficiency of the building stock,
- widespread energy poverty and vulnerability to price shocks.

The updated NECP addresses several of these root causes, particularly those related to the structure of the energy mix and overall energy demand. Key measures include:

- accelerating the deployment of renewables, which in the longer term supports lower wholesale electricity prices and reduces exposure to the cost of emission allowances;
- implementing the "energy efficiency first" principle and a package of measures in the building sector, such as thermal retrofits, improved control systems and modernization of district heating, which can permanently reduce energy consumption;
- gradually phasing out coal in individual and district heating, which limits exposure to both fuel price volatility and rising carbon costs;
- linking EU funding tools (Modernization Fund, Social Climate Fund) with national programs such as "Clean Air" to mobilize investment at household level.

Taken together, these actions – and in particular the projected growth of renewables to around half of electricity generation by 2030 – support a reduction of system-level cost risks. This direction is consistent with the index results, which points to expanding clean generation as a key driver of improved affordability over time.

However, the index also shows that household energy costs remain the single largest contributor to affordability risk, and in this area, the updated NECP is least closely aligned. Although the plan recognises tackling energy poverty as a strategic objective, specific instruments – beyond the reference to the Social Climate Fund – remain fragmented across different programmes and institutions. What is still missing is a comprehensive framework that combines:

- price regulation and market design,
- large-scale investment in energy efficiency, and
- targeted social protection for vulnerable groups

into a single, coherent mechanism for reducing cost risk.

As a result, in the affordability dimension, NECP ambitions clearly move in the right direction but do not yet match the scale of risk diagnosed in the ECSRI, particularly for low-income households. Full consistency will require closer coordination with policies that support building renovation, protect vulnerable consumers and prevent new inequalities from emerging during the transition.

5.1.3. Reliability risk: sound diagnosis, implementation challenge

In the reliability dimension, the ECSRI shows that risk has been gradually declining, although Poland still exceeds the EU average. The main challenges are: the still high share of coal in power generation, limited system flexibility and the slow modernisation of grid infrastructure.

The updated NECP reflects the logic of reducing reliability risk and addresses these issues through a broad package of measures:

- reducing the share of coal in the power mix and replacing it with RES and, later, nuclear power;
- modernizing and expanding transmission and distribution networks, with a focus on integrating offshore wind, future nuclear plants, energy storage and new consumers and prosumers;
- shifting from a centralized model to a more decentralized system architecture, based on distributed generation, prosumers, energy communities and local grids;
- strengthening cross-border interconnections to increase system balancing options and reduce the risk of shortages.

These actions are closely aligned with the list of priority interventions identified by the risk analysis. The main challenge lies not in the direction of change, but in the pace and quality of implementation. Large energy projects have long lead times, permitting and administrative procedures can delay investments, and electricity

demand is increasing due to electrification in transport, heating and industry. In the short and medium term, reliability risks may therefore remain elevated if the implementation capacity is insufficient.

5.1.4. Environmental and sustainability risks: strong ambition, uneven alignment

In the sustainability dimension, Poland has made visible progress: the energy and emissions intensity of the economy is declining, and the share of non-fossil electricity is increasing. At the same time, ECSRI indicates that the country still lags behind the EU average due to the dominant role of coal, low resource productivity, and a relatively weak circular economy.

The updated NECP raises the level of ambition significantly and addresses several core components of environmental risk:

- it sets ambitious greenhouse gas reduction targets,
- it foresees a dynamic expansion of renewables across power, heating, industry and – to a lesser extent – transport,
- it promotes hydrogen, low- and zero-emission technologies and CCS in hard-to-abate industries such as cement, steel and chemicals,
- it aims to increase R&D spending to 2.5% of GDP with a strong focus on decarbonization technologies.

On the other hand, sustainability risks stem not only from emissions but also from the high material intensity of the economy and the low level of circularity. In these areas, the updated NECP lags behind the risk diagnosis. The circular economy remains underdeveloped and is treated rather marginally in the plan, despite being an important component of long-term environmental and resource risk. In addition, the growing volume of municipal waste and low recycling rates suggest that a corresponding shift in consumption and production patterns does not yet accompany the energy-climate transition. In this sense, the NECP significantly reduces climate-related risks but does not yet fully exploit the potential synergies between lower energy use, reduced material intensity and a circular economic model.

5.1.5. Key findings

The updated NECP outlines an ambitious and modern vision for Poland's energy transition. In many areas – especially the energy mix, infrastructure and diversification – its assumptions are consistent with the risk diagnosis presented and identified in the ECSRI, making it a solid response to systemic and geopolitical risks.

However, the risk analysis also shows that the most pressing threats are social, cost-related and demand-driven. Without stronger and more coordinated action in these areas, the transition could maintain – or even increase – exposure to affordability and social risks.

In conclusion, the NECP provides a robust foundation for reducing geopolitical and reliability risks, and it substantially advances environmental objectives. To become a fully-fledged risk-reduction strategy, it will need to be complemented by:

- a stronger focus on building renovation and energy efficiency,
- more integrated and better targeted support for vulnerable consumers,
- faster decarbonization of transport, and
- a clearer integration of circular economy policies.

Only then will the plan not just change how energy is produced, but also how it is used and how its benefits and costs are distributed across society.

5.2. NECP ambitions through the lens of social acceptance findings

5.2.1. Climate and security: strong alignment and the potential for stable legitimacy

The clearest point at which NECP ambitions align with societal expectations is the shared climate–security axis. The study findings indicate that the most highly valued features of policy pathways are the minimisation

of climate-change impacts and the reduction of fossil-fuel imports. NECP is built around the same logic: decarbonisation is not presented as a detached objective, but as a modernisation project whose rationale and enabling condition is system resilience. Energy security is given priority status and is framed as a starting condition for achieving all transition goals. The document stresses that while climate neutrality implies a gradual move away from fossil fuels, during the transition it remains necessary to guarantee secure supplies of these fuels to the economy and end users. In the long run, zero-emission technologies and energy storage are expected to meet demand "reliably and at an acceptable cost."

This alignment has direct practical implications. Public support is strongest when climate objectives are simultaneously understood as objectives of security and stability. From an implementation perspective, this means selecting instruments, such as accelerated renewables deployment, grid expansion and modernisation, enhanced system flexibility, and energy-efficiency measures in a way that tangibly reduces the risk of shortages and price volatility.

The durability of this alignment will also depend on whether reducing import dependence is pursued not only through shifting supply routes. It will hinge on building resilience through diversification, maintaining a limited level of import dependence, and increasing the use of domestic – particularly zero-emission – energy sources. In this context, an important complement to the "transition pathway" is the development of alternatives that can reduce gas imports, while remaining attentive to the risk of creating new import dependencies in an immature market. Ultimately, the measure of this ambition will be whether, in households' day-to-day experience, the transition is confirmed as a more stable, predictable, and less shock-prone model for the functioning of the state and the economy.

5.2.2. Costs and affordability: the area of greatest social sensitivity

Even where the objectives of the transition are widely accepted, support for ambitious change does not eliminate concerns about its costs. In public debate – especially under economic pressure – affordability becomes the lens through which climate policies are assessed. Attention focuses less on the intrinsic merit of the transition and more on whether households can bear its costs, and whether proposed measures deliver tangible effects that reduce the risk of future shocks to household budgets. In this sense, the draft updated NECP explicitly links the transition to consumer protection. It emphasises that changes in the energy mix and system modernisation, supported by adequate investment, can stabilise energy prices and, over time, bring them down, rather than leading to a lasting increase in burdens.

At the same time, the document identifies a set of measures that, over the longer term, are intended to reduce cost-related risks: scaling up clean generation, modernising and expanding grids, and consistently prioritising energy efficiency as the "first-choice" principle in policy and investment planning. From the perspective of social acceptance, however, the "right direction" alone is not sufficient. What matters is the short- and medium-term cost trajectory and whether households are given practical tools to reduce their exposure to price volatility before the full system-wide benefits of the transition become visible.

At this point, two themes become particularly important because they connect the logic of the strategic document with social sensitivity. The first is improved energy efficiency, which translates system-level objectives into households' day-to-day experience. The updated NECP treats efficiency as a priority and notes that reducing energy use lowers operating costs, strengthens security, and reduces vulnerability to price fluctuations. At the same time, it recognises that the transition requires up-front investment that can be a barrier. This is why support mechanisms (such as grants, tax relief and other instruments) play a critical role: they broaden access to modernisation measures and help bring forward their economic benefits.

The second theme concerns the social perception of the pace of change, which depends on how quickly costs and obligations are felt relative to when benefits become tangible. The document recognises that implementation capacity does not materialise instantly: some measures (such as large-scale, deep building renovation) are expected to become dominant only in later phases, reflecting the time needed to develop delivery capacity and remove barriers. This matters all the more because the transition is experienced unevenly across regions, sectors, and household types. The updated NECP explicitly signals the risk of distributional impacts and regional inequalities, and the need to monitor and correct them. As a result, the same policy may

be perceived as "too fast" where costs materialise earlier, and "too slow" where benefits are expected immediately but emerge with delay.

Overall, it can be concluded that in the cost domain the NECP update moves in a direction consistent with the logic of social acceptance. The durability of public support will nevertheless depend on implementation. In particular, it will hinge on the broad availability of energy-efficiency and modernisation instruments, low barriers to entry, and a clear translation into economic benefits for households. Otherwise, the effects of the transition will remain fragmented, difficult to access, and invisible to most people.

5.2.3. Distribution of costs and benefits: a condition for the social durability of ambition

One of the key insights from the study on public acceptance of different energy and climate policy variants (Chapter 5) concerns how society understands the fairness of the transition. Preferences reveal a clear willingness to accept a moderately progressive distribution of burdens: a larger share of costs is considered acceptable when it is borne by a broader group of better-off households, whereas highly selective approaches shifting the burden onto a very narrow group do not increase support.

At the same time, there is a strong signal on the "transition dividend" side. Scenarios in which benefits are limited to a narrow group of beneficiaries are evaluated markedly worse than those that deliver effects felt broadly across society. This configuration suggests that social legitimacy depends not only on whether policy protects the most exposed groups, but also on whether the majority can recognise tangible benefits.

Against this backdrop, the draft updated NECP strongly frames the transition in terms of fairness and social protection. Already at the level of assumptions, it stresses the need to combine climate and energy objectives with security of supply and "acceptable prices" for consumers. It also notes that the long-term and capital-intensive nature of the transition requires a policy framework that allows sectors and workers to adjust and safeguards communities exposed to transitional costs. In addition, it explicitly develops the "just transition and consumer protection" component, emphasising that – with appropriate investment support – the transition should translate into stabilisation (and ultimately a decline) in energy prices.

What matters most, however, is the overall distributional logic created by the policy package as a whole. From a social-acceptance perspective, the most durable configuration has a two-tier structure. First, targeted measures protect households exposed to energy poverty and shield them from risks associated with ETS2. Second, a universal component ensures that most households experience tangible benefits. In this sense, NECP provides clear "anchors" for both tiers: it develops measures addressing energy poverty and links them to the Social Climate Plan and the Social Climate Fund as financing sources, while presenting building renovation and the rationalisation of heating needs as a pathway that reduces energy costs and improves air quality.

The "ambition test" in terms of fairness will therefore be decided in practice not by whether protection mechanisms exist (they are clearly present in the document), but by whether the transition is socially perceived as a project in which benefits are broad and visible, while support is fairly targeted to where risks are greatest.

5.2.4. Institutions, agency, and trust: a condition for sustaining support

The preferences study shows that support for the transition depends not only on what is planned, but also on who will deliver it, and how. Acceptance increases when policies are perceived as competently implemented, predictable, and "ours": rooted in national agency rather than framed merely as a response to external pressure. In practice, trust acts as a stabilising mechanism: the greater the credibility of institutions, the greater the willingness of society to accept transitional costs in anticipation of longer-term benefits.

The draft updated NECP strengthens its credibility through a detailed account of how the document was prepared and by grounding it in analyses and modelling (both system-level and macroeconomic). This signals that the proposed directions are not simply declaratory, but the result of evidence-based work.

It is also worth emphasising that NECP update frames implementation as a multi-actor process. Alongside central government, a significant role is assigned to businesses as investors and implementers of modernisation, including in energy efficiency (for example through the development of ESCO services). A similarly important role is envisaged for local governments, particularly in locally delivered measures such as

distributed energy, energy communities, and deployments in transport and public buildings. This implementation architecture matters directly for acceptance: it is at the local level, and through day-to-day interactions with energy services and support programmes, that people effectively "test" the state's capacity to deliver.

In this sense, the key challenge for NECP ambitions lies not in the design of goals themselves, but in institutions' ability to implement them coherently – reducing uncertainty and reinforcing policy predictability over time. This is especially important in periods when transitional costs are more visible than long-term benefits, and when social assessments of the transition are shaped by the immediate experiences of households and businesses.

5.2.5. Key findings

Comparing the NECP with findings on social acceptance leads to three key conclusions.

First, alignment is strong at the level of strategic objectives. Society places the highest value on limiting the impacts of climate change and reducing fossil-fuel imports. The NECP structures the transition around precisely this dual axis: climate action understood as reducing long-term risks, and security understood as resilience to price and geopolitical shocks.

Second, the main potential source of resistance is not opposition to decarbonisation as such, but sensitivity to costs and uncertainty about how the transition will unfold. Sustaining acceptance will depend on whether the transition becomes "felt" in households through lower cost pressure. Of particular importance here are improvements in energy efficiency and building modernisation, as well as whether the benefits of the transition are visible broadly enough that they are not perceived as a privilege for a few.

Third, distributional fairness is a condition for sustaining ambition over time. Social preferences point to acceptance of a moderately progressive cost distribution and a clear preference for scenarios in which the benefits of the transition are widely shared. The NECP includes extensive protective measures and just transition components, but their social robustness will be greater if they operate as part of a broader package of universal outcomes. Its foundations should include system stability and predictability, improved quality of energy services, accessible modernisation, and health and environmental co-benefits (including better air quality).

Overall, NECP ambitions "measure up" well against social preferences, but their social feasibility remains conditional. What will determine success is less the stated level of targets than the coherence and pace of implementation, the ability to limit transitional costs, and the consistent building of trust in institutions – also at the local level and through citizens' day-to-day interactions with energy services and support programmes.

5.3. Alignment of the updated NECP with EU climate and security goals

The updated NECP is clearly embedded in the European Union's logic: the energy transition is intended to reduce emissions while simultaneously strengthening national resilience through supply diversification, system modernisation, and the development of new generation capacity based on zero-emission sources. In this sense, the plan does not treat security as an "add-on" to climate policy, but as a precondition for its success.

This alignment is most evident in areas where the EU requires Member States to provide clear, quantitative contributions or where geopolitical risks directly influence infrastructure decisions. At the same time, where the EU pathway demands the fastest emissions cuts in ETS-covered sectors, and where success depends on large-scale, demand-side delivery (energy efficiency, transport, buildings), the NECP reveals significant gaps between ambition and likely implementation.

In terms of alignment with EU objectives, the strongest aspect of the NECP is its focus on ensuring the security of supply and system resilience. The plan describes a further strengthening of the diversification architecture (including the role of LNG and solutions that increase the flexibility of import routes) and emphasises the protection of critical infrastructure, including in the area of cybersecurity. These elements fit squarely within the EU agenda of resilience and reduced vulnerability to supply shocks, particularly in a volatile geopolitical environment.

Regional integration is framed in a similar way. The NECP highlights the need to expand cross-border interconnections and implement internal market rules, while also pointing to projects of strategic importance for the synchronisation of the Baltic region and the secure operation of the power system.

In the climate dimension, the plan aligns with the EU framework, which translates EU policy into concrete national commitments. This applies above all to the non-ETS sectors: Poland has a binding ESR target for 2030 (−17.7% vs 2005), while the NECP projects an outcome of around −18.2%, which is broadly consistent with the requirement. Similarly, in the area of renewables, the plan sets out a national "contribution" for 2030 (32.6% RES in gross final energy consumption) explicitly anchored in the EU's increased ambition under RED III.

However, when we move from the level of "alignment architecture" to the question of the pace of emissions reductions and the real capacity to deliver demand-side outcomes, the picture becomes more ambiguous. The first gap concerns the consistency of the NECP projection with the EU-wide 2030 climate target. The EU target is defined at Union level (at least −55% compared to 1990), rather than as a country-by-country obligation. Against that benchmark, the NECP projects an emissions reduction for Poland of around −50.4% by 2030 (vs 1990). This does not imply non-compliance with a national target, but it signals a potential shortfall in alignment with the EU-wide trajectory, unless the difference is offset by stronger reductions elsewhere across the EU.

The contrast is even more pronounced in ETS-covered sectors, which in the EU framework are expected to deliver a large share of the overall decarbonisation effort. The ETS is governed by an EU-wide cap rather than national targets, and the EU trajectory implies a reduction of around −62% by 2030 compared to 2005. Against that benchmark, the NECP projection for Poland (around −49.4% in 2030) signals a potential gap in the pace of change relative to the EU-wide pathway, unless it is offset by stronger reductions elsewhere within the ETS. This suggests a slower pace of ETS decarbonisation relative to the EU-wide pathway, with implications for both emissions outcomes and the cost and stability of the transition.

The second critical gap concerns energy efficiency. In the area of final energy consumption, the NECP declares an ambition equivalent to a 12.8% improvement, but at the same time indicates that the projected effect (around 4.6%) does not close that gap. In practice, this means higher energy consumption than assumed in EU regulations. This is not merely a technical shortfall. An insufficient pace of efficiency improvement implies higher energy demand in 2030, and therefore the need to maintain greater generation and reserve capacity, a larger scale of grid investment, and more frequent dispatch of costly fuel-based sources. As a result, system costs and exposure to fuel-price volatility and emissions allowance prices increase, and (indirectly) so does vulnerability to imports.

The third area where the plan clearly fails to keep pace with EU logic is transport – a sector where climate objectives are directly linked to dependence on imported oil. The document notes that achieving the target level of renewables in transport is the most difficult, and the projected share of renewables in transport in 2030 is around 17.7%. In addition, the NECP signals that transport emissions in 2030 will remain higher than in the base years (1990 and 2005), suggesting a persistent structural barrier to full alignment with the EU's reduction pathway. From a security perspective, this means that the reduction of import-related risks may be slower precisely in the sector that maintains dependence on liquid fuels for the longest.

Finally, a key feasibility test concerns buildings and district heating. The plan sets targets here, but also signals that delivering the required rate of change may be difficult. This matters because three EU objectives overlap in this area: decarbonising heating, limiting pressure on household budgets, and strengthening system resilience by reducing energy consumption. If modernisation progresses more slowly, it does not necessarily determine the failure of the entire transition, but it increases the risk that some benefits (lower bills, reduced exposure to fuel and CO_2 price swings, and faster emissions reductions) will materialise later and in a more socially uneven way.

In summary, the NECP aligns most strongly with EU objectives where the transition is driven by infrastructure and strategic measures such as supply diversification, regional integration, and strengthening system resilience. A high level of alignment is also evident where progress is assessed against specific, binding EU frameworks – most notably through the renewables contribution. Alignment with the European trajectory is weaker, however, in the areas that determine whether the overall 2030 effort "closes": the pace of emissions reductions in ETS sectors, the scale of the energy-efficiency improvement that is actually achieved, and the speed of transport transformation.

6. Conclusions and policy recommendations

The analysis of Poland's NECP, viewed through the lens of transition risks and social preferences, suggests that the central challenge is no longer limited to the level of ambition expressed in targets. It is increasingly about the feasibility and durability of the transition pathway. In practice, this requires managing three dimensions in parallel: (1) strategic coherence and delivery capacity, (2) cost resilience and social legitimacy, and (3) energy and climate security understood more broadly than supply alone – namely the ability of the energy system and households to withstand price volatility, geopolitical disruptions and the growing variability of power generation.

The findings point to affordability as the most sensitive area. Costs, and the way they are distributed, are likely to be decisive for public acceptance and, consequently, for the pace of implementation. At the same time, ensuring system reliability up to 2035 requires treating the scale-up of renewables, energy efficiency and system flexibility as a single package. Delays in grids, storage and demand-side solutions risk slowing down the materialisation of transition benefits and increasing pressure for ad hoc price interventions.

Against this background, the recommendations presented in this chapter are not intended as a separate policy agenda, but as implementation-oriented implications derived directly from the diagnostic sections of the report. They identify measures that reduce the key risks highlighted in the analysis (cost, reliability and social risks), strengthen coherence across strategic documents, and help secure durable public support. The recommendations are organised across three areas: (i) energy governance, (ii) policy framework and communication for an affordable transition, and (iii) energy and climate security.

6.1. Recommendations on energy governance

Effective delivery of the NECP will depend not only on the ambition of targets, but on the governance capacity to translate them into coordinated action across sectors and levels of administration. The recommendations below therefore focus on strengthening strategic coherence, monitoring and accountability, and maintaining an institutionalised stakeholder dialogue. Together, these elements reduce implementation risk and help ensure that the NECP functions as a credible framework for policy delivery.

Ensuring regulatory stability and coherence in the strategic architecture of the energy and climate transition

It is recommended that the updated NECP serves as the overarching document (the main point of reference) for other strategies and sectoral plans. This requires clarifying the hierarchy of policy documents and ensuring consistency in objectives, assumptions and timelines across policies for energy, climate, industry, transport, buildings and social policy. The updated NECP should provide the basis for a clear direction of travel as well as the framework for implementation instruments and financing.

Strengthening the system for monitoring NECP implementation

Indicators used to monitor NECP implementation should capture not only emissions reductions, but also parameters that determine the durability and feasibility of the transition – particularly affordability, reliability and sustainability. NECP monitoring should therefore cover not only emissions indicators, but also key milestones stemming from linked sectoral strategies and implementation plans, as delays in these areas directly increase the risk of missing NECP targets. In practice, this means tracking a limited set of cross-cutting delivery indicators (e.g. progress in grid upgrades and connections, the pace of building renovation, and implementation in district heating) and assessing their implications for affordability, reliability and sustainability. Where deviations occur, the monitoring system should trigger a corrective mechanism that identifies the causes of delays and recommends remedial measures (regulatory, procedural or financial). This mechanism should have a designated responsible institution and a clear decision-making procedure, so that monitoring translates into concrete corrective action.

6.2. Recommendations on policy design and communication

Public acceptance is shaped less by abstract targets than by whether the transition is experienced as affordable, fair and predictable. In particular, the perceived distribution of costs and benefits, and the credibility of the state's commitments will determine the durability of support over time. The recommendations below focus on shifting from ad hoc price protection to structural cost resilience, ensuring transparent and socially legitimate financing, and communicating the transition through the lens of security and stability.

Replacing ad hoc price shields with a durable cost-protection strategy

It is recommended to shift the emphasis from short-term price interventions towards structural measures that permanently reduce households' exposure to energy price volatility. Priority should be given to investments that lower energy consumption among low-income households, in particular deep building renovation and the replacement of heating sources. The effectiveness of this approach also depends on putting the architecture of protection measures in order. This includes setting a clear timetable for phasing out ad hoc interventions and establishing target arrangements for protecting vulnerable consumers. In this way, cost-risk management can rely on durable mechanisms rather than temporary solutions.

At the same time, the introduction of ETS2 should be supported by a coherent social protection package. This package should follow a two-track design: effective protection for vulnerable groups and a "universal" component that strengthens policy legitimacy through benefits that are visible to a broader group of households (e.g. improved air quality, more stable bills and better service quality). Eligibility criteria and communication should minimise a sense of exclusion among "in-between" households – those that do not qualify for support but still feel rising costs.

Introducing moderately progressive financing mechanisms and ensuring full transparency of cost allocation and revenue use

It is recommended that transition financing instruments incorporate a moderately progressive distribution of burdens while avoiding an excessive concentration of costs on a narrowly defined social group. This approach reduces the risk of polarisation and perceptions of unfair burden-sharing, and strengthens the durability of social legitimacy. At the same time, full transparency is essential—clearly specifying who bears higher costs, on what criteria this distribution is based, and providing an accessible account of how the revenues raised are used.

Strengthening trust through a coherent communication framework

It is recommended to adopt a coherent, long-term communication strategy in which climate and energy policy is presented not as an end in itself, but as a tool for strengthening national security and stabilising the cost of living. In parallel, the logic of action should be clearly explained: what the costs are and who bears them, what protection mechanisms exist for vulnerable groups, and how revenues (e.g. from market-based instruments) are reinvested in solutions that reduce costs and risks over the longer term. To sustain credibility, communication should be transparent and evidence-based, with regular reporting on progress, clear identification of barriers, and a rationale for policy adjustments.

6.3. Recommendations on energy and climate security

Energy and climate security should be treated as an integral dimension of the NECP, encompassing exposure to external shocks, system reliability and the resilience of households to price volatility. The period up to 2035 is particularly critical, as system transformation must proceed while maintaining reliability in the face of changing generation patterns and geopolitical uncertainty. The recommendations below therefore prioritise reducing fossil fuel dependence while building the flexibility and resilience needed to secure stable supply and manageable costs.

Strengthening energy security by reducing fossil fuel use and accelerating investment in system flexibility by 2035

It is recommended to treat the transition period – before nuclear power fully enters the system – as a critical phase for strengthening energy security. Accelerating the deployment of renewables and energy-efficiency measures should be accompanied by parallel investments that increase system flexibility and balancing capacity. At the same time, strengthening security should not mean replacing one dependency with another; it should account for diversification of solutions and supply chains and for strengthening regional resilience, inter alia through market integration and cross-border cooperation.

In practice, this implies prioritising the modernisation and expansion of transmission and distribution grids, the development of energy storage and demand-side management tools, and the strengthening of interconnections—so that a growing share of variable generation does not translate into higher risks of capacity shortages, network constraints or reduced reliability of supply.

Strengthening energy security through cost resilience: reducing the risk of price shocks for households

It is recommended to recognise that energy security is not limited to supply and infrastructure, but also includes consumers' resilience to fluctuations in energy costs. In practice, this means prioritising structural measures that permanently reduce energy use and bills. An implementation component should include systematic reporting on progress and early identification of deviations, so that corrective measures can be activated before ad hoc protective interventions become necessary.

Taken together, the analysis in this report shows that the credibility of Poland's transition pathway will ultimately be determined not only by targets, but by delivery capacity and social durability. A coherent strategic framework, risk-aware monitoring and transparent, inclusive policy design can reduce exposure to price and security shocks while strengthening public trust. If these conditions are met, the NECP can function as a robust backbone for an affordable, secure and widely supported energy and climate transition in the years ahead.

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