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EU ENERGY RISK MANAGEMENT CONCEPT IMPLEMENTATION AMONG MEMBER STATES: CASE STUDIES OF POLAND

ВПРОВАДЖЕННЯ КОНЦЕПЦІЇ УПРАВЛІННЯ ЕНЕРГЕТИЧНИМИ РИЗИКАМИ В КРАЇНАХ-ЧЛЕНАХ ЄВРОПЕЙСЬКОГО СОЮЗУ: CASE STUDY НА ПРИКЛАДІ ПОЛЬЩІ

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Abstract. *This article explores the fulfilment of energy risk management concept among European Union (EU) member states, with a particular focus on Poland. It analyzes the strategies employed to mitigate risks to energy security, including diversification of sources, energy efficiency measures, and regional collaboration within the EU framework. The analysis highlights the challenges and opportunities that arise from applying risk-focused decision-making processes within the unique regulatory and geopolitical landscape of the EU. Through a comprehensive case study of Poland, the article demonstrates how these concepts have been translated into practical measures and the potential implications for other member states.*

Keywords: *European Union, Poland, risk management, energy security, solidarity, diversification, renewable energy sources*

Анотація. *У цій статті досліджується реалізація концепції управління енергетичними ризиками в країнах-членах Європейського Союзу (ЄС), зокрема на прикладі Польщі. У ній аналізуються стратегії, що застосовуються для зменшення ризиків для енергетичної безпеки, включаючи диверсифікацію джерел, заходи з покращення енергоефективності та регіональне співробітництво в рамках ЄС. Аналіз висвітлює виклики та можливості, що виникають при застосуванні ризик-орієнтованих процесів прийняття рішень в унікальному регуляторному та геополітичному ландшафті ЄС. На прикладі Польщі показано, як ці концепції були втілені на практиці, а також потенційні наслідки для інших країн-членів ЄС.*

Ключові слова: *Європейський Союз, Польща, управління ризиками, енергетична безпека, солідарність, диверсифікація, відновлювані джерела енергії*

Introduction. The current geopolitical changes in a tense international environment are a catalyst for corresponding transformations in the concepts of energy security. Global and regional actors play different roles in the global energy balance, but their resource potential or availability of technology determines their place in the international arena. In particular, diversification of energy supply sources to overcome dependence on foreign energy and investment in the development of renewable energy sources are becoming more and more important.

An equally crucial part of the energy security concept is the development of risk management mechanisms. As the energy crisis worsens, states need to respond appropriately to certain threats in order to minimise losses. And coordinating efforts can become a tool for ensuring both national and regional security.

The European Union (EU), a leading normative and technological power, presents a unique case study in energy risk management. As a bloc, the EU has established a comprehensive approach that prioritizes the diversification of energy sources to mitigate dependence on any single supplier. This strategy is further bolstered by robust energy efficiency measures aimed at reducing overall consumption. Recognizing the interconnectedness of the energy market, the EU also actively promotes regional cooperation under the solidarity principle to ensure a stable and secure energy supply.

Poland's relevance as a case study stems from its status as a crucial part of the EU economy, significant dependence on fossil fuels amid a push for cleaner energy sources, ongoing efforts to diversify its energy supply, and a strong emphasis on national energy security, by which it may neglect some European standards.

The aim of the article is to identify the specifics of European Union's risk management approach towards energy security on the example of interaction with Poland as a member state. Taking into account the aim of the article, we have defined the following objectives:

- To identify the specific features of the risk mitigation process within the European Union.
- To explore how the approach to risk management has evolved over time within the EU.
- To perform a critical review of the case of Poland as an evaluation of EU energy risk management implementation efficiency.

Literature review. To gain a deeper understanding of risk management on both sides, a variety of sources was thoroughly examined. Andrea Sangiovani provides an understanding of the concept of EU solidarity *(Sangiovanni: 2013),* while Oksana Okhrymenko and Iryna Manaienko elaborate on this principle in the context of energy security *(Okhrymenko & Manaienko: 2022)*. Bernardo Delogu reveals the multidimensionality of the concept of "risk" and the importance of its assessment in EU decision-making *(Delogu: 2016)*. Matúš Mišík and Andrej Nosko explore the paradoxical nature of EU energy solidarity *(Mišík & Nosko: 2023).* The peculiarities of the Polish national energy policy and its adaptation to EU standards were reviewed by Krzysztof Tomaszewski (*Tomaszewski: 2020).*

Statistical information made by International Energy Agency *(International Energy Agency: 2017),* regulations, strategies and other publications of the EU institutions were also used in the study.

Main research results.

EU risk management approach in energy security

The European Union's energy security concept is based on the principles of solidarity and cooperation in various scopes (technological, economic, scientific, political, etc). According to Andrea Sangiovanni, solidarity is the desire of member states to help each other overcome the crisis and preserve the unity of the EU *(Sangiovanni: 2013)*. He stresses that this assistance can be both financial and technical, and can include the exchange of knowledge and experience. In the context of energy security,

this means that EU countries work together to solve problems that may arise in the supply of energy resources and provide support in the event of an energy crisis.

According to O. Okhrymenko and I. Manaienko, European energy solidarity is primarily a set of principles, goals, mechanisms, and rules of conduct for energy market actors, whose goal is not only to produce and supply energy resources but also to meet the needs of all stakeholders in ensuring energy security in response to new threats and challenges *(Okhrymenko & Manaienko: 2022)*. This can be done by managing specialized risks against relying on regional needs. At the present stage, in the spirit of solidarity, the REPowerEU platform was formed, which sets three strategic priorities: to secure, to diversify, and to produce. This includes reducing natural gas consumption and, consequently, import dependence primarily on russian energy, producing safe and affordable energy, and complying with the European Green Deal in the context of the comprehensive implementation of renewable energy sources *(European Commission: 2024a)*.

The European Commission defines risk in its Better regulation Toolbox. It states that risk is the probability (high or low) of hazard causing harm to someone or something. It also proposes a risk formula - a hazard (expressed in terms of its negative impact) multiplied by the probability of its occurrence, vulnerability, and exposure. The document defines the concept and algorithm of risk assessment. Risk assessment is the basis for risk management, which is the development and implementation of measures that help reduce and, if possible, eliminate the likelihood of exposure to a hazard, as well as reduce and minimize the consequences. The risk-based approach in legislation is aimed at controlling or limiting the impact of a hazard and can be conducted in three steps: determining the threat, evaluating the probability, and characterizing the risk itself by using quantitative and qualitative methods *(European Commission, 2023)*. The level of importance of a risk is based on specific criteria. These criteria can include scientific limits, how easily the risk can be controlled, the balance between the risk and its benefits, public perception of the risk, and societal values like fairness and individual freedom. They might be outlined in existing laws or regulations, or based on how risks have been handled in the past. By comparing the assessed risk to these criteria, those responsible for managing risk can decide if the risk is acceptable or not.

According to Bernardo Delogu, regardless of how risk is defined in specific situations, it is clear that it is largely not reducible to a single indicator. Comparing risks requires a thorough analysis of all their aspects and dimensions. At the same time, the concepts of risk and risk assessment are the basis for decision-making and regulatory practice in many areas of EU policy, including health, food safety, consumer protection, environmental and climate protection, and the harmonization of technical standards for the internal market *(Delogu: 2016, p. 101)*.

General or special-purpose legal acts define the possibility of energy security risks. For example, the European Commission's Communication on the Economic Strategy of the European Union of 20 June 2023 states that one of the serious threats to European economic security is the existence of risks to the stability of supply chains, price spikes, unavailability or shortages of critical products or inputs in the EU, including those related to the “green transition” necessary for a stable and diversified energy supply *(JOIN/2023/20 final)*.

The EU's risk management mechanisms were revised during the gas conflicts between Ukraine and russia back in 2006 and 2009. As a logical consequence, the European Energy Security Strategy was adopted in 2014, and the Sustainable Energy Union Strategy in 2015. These documents state that energy security is a key to the existence of the European Union. Internal synergies should be built between member states, and the EU, in turn, should intensify the process of diversifying energy supplies by building cooperation with exporting countries, as the main risk is a disruption of uninterrupted supply of resources against the background of possible geopolitical tensions (*COM/2014/0330 final)*.

In the briefing ‘Four challenges of the energy crisis for the EU's strategic autonomy’, the European Parliament identifies the following risks and, accordingly, challenges in the following sectors:

- **Network interconnection**: lack of reliable networks, breach of stability.
- **Security of supplies**: significant dependence on external energy carriers, the need to compensate for them to ensure autonomy, reduction of reserves.
- **Renewables efficiency savings:** insufficient investment in green energy, unwillingness to reduce the use of fossil fuels, primarily coal.
- **Energy market**: market fragmentation, nationalisation of industry, further rise in energy prices *(European Parliament: 2023).*

One of the risks to the energy security of the European Union at the present stage is the violation of the above-mentioned principle of solidarity. In the first year of russia's full-scale invasion of Ukraine, the European Commission decided to stay put with the EU's energy mix in favor of the aggressor country. Within the framework of the REPowerEU platform, the member states were proposed to voluntarily reduce natural gas consumption. However, this initiative was met with resistance from traditional eurosceptic countries, including Hungary. In particular, it was Hungary that blocked the decision to impose an embargo on russian oil in May *(Abnett et. al.: 2022)*. Several other countries called for a "reconsideration of solidarity" in favor of uninterrupted natural gas supplies rather than restrictions, which is why this principle was perceived differently by each member state *(Mišík & Nosko: 2023)*.

Climate change, which is becoming increasingly evident to society, is driving political transformation, stimulating a shift towards clean energy sources such as solar, wind, and water. This process, known as the energy transition, is leading to the decarbonization of the economy and the development of low-carbon energy. The European Union has set itself the ambitious goal of becoming a global "green economy" leader by providing technologies and standards to other countries. The EU has developed a set of mechanisms for risk management within the framework of the European Green Deal. What is more, the Fit for 55 package plays a crucial role in EU energy security risk management. By establishing ambitious targets for reducing greenhouse gas emissions and transitioning to renewable energy sources, the package aims to reduce the EU's dependence on fossil fuels, particularly natural gas from Russia. This transition not only contributes to climate goals but also strengthens the EU's energy resilience by diversifying its energy mix and reducing exposure to volatile global energy markets. Additionally, the Fit for 55 package promotes investments in energy efficiency and renewable energy infrastructure, enhancing the EU's energy independence and reducing its vulnerability to supply disruptions *(European Council: 2024).*

Together, they form the following mechanisms for ensuring energy security. The first mechanism is formed as a set of legislative regulations such as the European Climate Law, the Renewable Energy Directive, the Energy Efficiency Directive, the EU Emissions Trading System, etc. It promotes sustainable practices in the energy sector, as well as legal clarity and consistency, reducing regulatory risks for businesses.

The second is a combination of financial instruments.The EU uses the European Green Deal Investment Plan and the Just Transition Mechanism, which aim to attract investments from states and organizations in sustainable projects, especially in those regions that suffer the greatest losses from the transition to a green economy.

The third one is identified by research and innovation. Certain specialized EU institutions (European Environment Agency), scientific committees established by the European Commission, and groups of technical experts may be involved in assessing and developing strategies to overcome risks. In addition, grants aimed at adapting to new technologies, overcoming climate change, and sustainable development may be provided for individual projects under the above financial mechanisms.

The final mechanism concerns international cooperation. The European Green Deal aims to promote multilateral cooperation in tackling climate change and promoting sustainable development. To address geopolitical, economic, and social risks, the EU is trying to engage its partners in the provisions

of international agreements (the Paris Agreement). This will help transform risks into opportunities for experience exchange and broader cooperation *(COM/2019/640 final)*.

Hence, as highlighted by recent events such as geopolitical tensions and supply disruptions, the European Union (EU) faces various challenges in ensuring a stable, resilient energy supply. To navigate these complexities, the EU has adopted the mechanisms, incorporating risk mitigation in diversification of energy sources, enhancement of energy efficiency, and promotion of renewable energy technologies. However, the path toward comprehensive energy security demands continual adaptation and collaboration among member states, stakeholders, and international partners. By fostering innovation, modernizing infrastructure, and enhancing the solidarity principle, the EU can fortify its energy security framework, safeguarding against potential hazards.

Poland case study

As a member state of the European Union, Poland is obliged to harmonize its national energy policy with EU norms and standards. This applies not only to diversifying energy sources, reducing dependence on fossil fuels, and increasing energy efficiency but also to the wider use of renewable energy sources. However, this harmonization process is accompanied by a set of risks.

The main ones include the high cost of modernizing energy infrastructure, the need to attract significant investments in the latest technologies, overcoming the socio-economic consequences of fossil fuel abandonment, and the impact of the russian-Ukrainian war and the global energy crisis on the geopolitical situation in the region. At the same time, there is a solidarity dilemma: will energy and climate issues be a high priority for EU member states, as well as for supranational institutions?

There is a gap between the EU's ambitious plans for renewable energy development and the complex reality in Poland, where numerous systemic problems are holding back the implementation of these plans. These are largely complex and include the following aspects:

- Legal: changes in the legal and regulatory framework to encourage investment in renewables and facilitate their implementation.

- Technological: modernizing infrastructure and improving technologies to increase the reliability and efficiency of renewable sources.

- Social: social issues associated with the transition to renewables, including the impact on employment in traditional energy sectors (oil, gas, coal).

At the current stage, the European Commission is trying to act in two different ways towards Poland. On the one hand, the EU recognizes the positive steps taken by Poland to support its energy transition and promote energy security. The development of renewable energy sources and steps to diversify sources of raw materials were praised. On the other hand, the EU expects Poland to move more rapidly, including legislative changes implementation aligned with the Fit for 55 package. For example, the European Commission, as noted, requires Poland to liberalize its renewable energy legislation to encourage onshore wind projects *(Kardaś: 2023)*. Nevertheless, under the pretext of protecting its sovereignty, Poland is trying to obstruct the EU's activities in the field of climate protection and energy, although this only weakens its negotiating position. There are several reasons for this. Firstly, the lion's share of the energy sector is made up of fossil fuels. In particular, coal-fired power plants generate about 71% of the country's electricity (*International Energy Agency: 2022)*. However, the rapid transition to renewable energy sources also includes the loss of jobs in the coal industry and economic stability in the regions that are most dependent on this type of fuel. Secondly, it is the need to modernize the country's energy infrastructure to accommodate renewables, which involves significant investments. Finally, there is the political background. The Polish government, dominated by Law and Justice, has favored short-term economic benefits over long-term climate goals and has often claimed that EU regulations are more likely to infringe on national sovereignty *(Strzałkowski: 2024)*.

Speaking about Poland's energy mix, the share of renewable energy sources in the country is currently around 12%. At the same time, Poland continues to rely heavily on solid fossil fuels (primarily

lignite), which account for almost 43% of its primary energy balance (*Eurostat: 2023)*. However, there has been a positive trend in the production of electricity from renewable sources since 2015, when the share of RES was up to 10%. Back in 2015, solar energy wasn`t actually utilized according to the statistics. Wind energy accounted for 7.5% of total electricity generation. Nowadays, wind and solar energy account for the largest share among the RES: 14.6% and 8.7% respectively *(Notes from Poland: 2024).*

It is also important that according to the Energy Strategy of the Republic of Poland, which was adopted back in 2021, there is no talk of building a power plant powered by solid fossil fuels *(Ministry of Climate and Environment, Republic of Poland: 2021)*. Although this means less environmental pollution, Krzysztof Tomaszewski, who is an Associate Professor at the Faculty of Political Science and International Studies (University of Warsaw) believes that Poland's generating capacity is insufficient and that electricity demand is expected to grow in the coming decades *(Tomaszewski: 2020).* However, the lack of a clear vision for reducing the share of coal in the country's energy balance while avoiding the issue of lack of generating capacity could become a serious obstacle for Poland in the process of transforming its energy sector and achieving the goals of the new European Green Deal.

Another cornerstone between Poland and the EU is the risk of the country's failure to implement the Emissions Trading Scheme. Poland is considered to be one of the most carbon-intensive countries among the EU. The average rate of carbon emissions per person in the country is 8.5 tonnes *(Ritchie & Roser: 2023).* Poland was the only country to vote against the Carbon Border Adjustment Mechanism in April 2023 *(Europe Daily Bulletin: 2023).* Its government demanded a reduction in the cost of allowances, even though the country's emissions exceeded it. Despite attempts to reform the system, the European Commission decided that emissions would be charged to the heating and automotive sectors *(Gramwzielone.pl: 2023).* The reason for this is the above-mentioned dependency on solid fossil fuels while Poland is taking steps to develop and, what is more crucial, implement a long-term strategy.

According to the European Parliament and Council Directive on renewable energy sources, EU member states, including Poland, are obliged to increase the share of RES to 32% by 2030 *(DIRECTIVE 018/2001).* In 2019, Poland adopted the National Energy and Climate Plan 2021-2030 (NECP), which emphasized the importance of decarbonization and diversification of energy sources amid growing demand (*Ministry of State Assets: 2019)*. The European Commission and the Polish government are continuing consultations on the further development of a NECP, which is a mandatory requirement for EU member states. The advantage of such regulatory instrument is that it paves the way towards a long-term lowering of carbon emissions and implementing EU energy security standards along with taking into account national peculiarities in such scope. Poland demonstrated a strong will to transform its economy sustainably, but the main risk is so-called “challenging domestic conditions”, including a pro-coal energy mix. For its part, the European Commission recommends that Poland reduce greenhouse gas emissions by 17.7% by 2030 and increase the share of renewable energy sources to 32%, although in the first version of the Plan Poland set a target of 29.8% *(European Commission: 2024b).* Poland's divergence from the European approach in its National Energy and Climate Plan stems largely from its reliance on coal as a primary energy source. This reliance is deeply ingrained in the country's economy and energy infrastructure, providing employment and supporting industries. Rapidly transitioning away from coal would pose significant economic and social challenges, particularly in regions heavily dependent on coal mining. Additionally, Poland's geopolitical situation, located on the eastern frontier of the EU, has influenced its energy strategy, prioritizing energy security and independence.

Regarding the social aspect of risks, Poland can attract funds from the EU Social Climate Fund and the Just Transition Fund to comply with the energy transition plan. The first one is aimed at financing activities and investments aimed at supporting households and small businesses. This, in turn, will allow Poland to establish an efficient “energy dialogue” with the EU and improve its political position. In turn, the second fund, designed to address the country's energy transition challenges, provides €3.85 million.

These costs are directed to the regions that are most dependent on coal (Silesia, Lesser Poland, Greater Poland, etc.). The Just Transition Fund will help the population of these regions in the transition to green energy, create new jobs, and contribute to a cleaner environment *(European Commission: 2022).* In general, such financial instruments may be a good incentive for a member state. However, Poland lobbies a National Recovery Plan, which also includes costs for energy sector transformation, to be revived.

Thus, the case of Poland and the EU's common dialogue towards energy risk management demonstrates the confrontation between supranational standards and national peculiarities. Poland is still relying on coal which has a greater share in its energy mix. Nevertheless, a dialogue between EU and the member state is pivotal and the harmonization of policies is an important step towards complete solidarity.

Conclusions. The European Union's approach to risk mitigation in the energy sector is characterized by a multifaceted strategy that combines EU-wide policies, national initiatives, and international cooperation. Key features of this process include risk identification and assessment, risk mitigation measures, crisis management, and a focus on enhancing energy security and resilience. Solidarity among EU member states plays a crucial role in mitigating energy risks. By sharing resources, coordinating responses, and supporting vulnerable member states, the EU can collectively address challenges such as supply disruptions and price volatility. The Green Deal and the Fit for 55 package are essential components of the EU's risk mitigation strategy. These initiatives promote the transition to a clean energy economy, reduce dependence on fossil fuels, and enhance energy security. By investing in renewable energy, energy efficiency, and infrastructure, the EU can diversify its energy sources, reduce its vulnerability to geopolitical shocks, and build a more resilient energy system.

However, Poland, due to its location and recent energy issues, probably doesn't think that a pre-made risk management plan is enough to keep its energy safe. Even though the EU has helpful tools and guidelines, Poland's specific problems—like using too much coal, its location, and the complicated political situation in the area—need a more customized solution. A good risk management plan for Poland would need a mix of EU-wide plans, Polish laws, and maybe even agreements with other countries. This plan should consider many different risks, like political problems, problems with getting supplies, cyberattacks, and climate change. It should also be able to change and adapt to new problems and opportunities in the energy industry.Further research of the topic of this article is needed to explore the long-term effectiveness of these mechanisms, particularly in the face of evolving geopolitical dynamics and the ongoing shift towards renewable energy sources. The relevance is higher when it comes to the member states which are not eager to drastically change their energy mix and traditional suppliers in accordance with EU common energy policy. It is also crucial to examine how EU-level policies and initiatives can better support national efforts, ensuring a more resilient and secure future for all member states.

In general, the examination of energy risk management within the EU, with a spotlight on Poland, reveals a complex landscape shaped by diverse energy mixes, varying degrees of reliance on external suppliers, and the overarching goal of a sustainable energy transition. While the EU provides a framework for cooperation and coordination, individual member states like Poland must tailor their strategies to their unique circumstances. The Polish case highlights the importance of diversification, investment in both fossil fuel and renewable energy sources, and a proactive approach to risk assessment and mitigation. Lessons from Poland's experience can inform other EU nations as they navigate their own paths toward energy security in an increasingly uncertain global environment. That is why developing a common approach is highly important for the EU to ensure its role as a normative and technological power and take the leading place in the global energy mix.

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