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Impact of the Margonin Wind Farm Energy Project on the Socioeconomic Development of Poland

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Thesis Pitch

Please, access the Pitch video presenting my thesis answering the research question "How does the Margonin Wind Farm Energy Project impact the Socioeconomic Development of Poland?" via this link: https://youtu.be/U6qGVpMq7Wc

Statutory Declaration

I hereby declare that I have composed the present thesis autonomously and without use of any other than the cited sources or means. I have indicated parts that were taken out of published or unpublished work correctly and in a verifiable manner through a quotation. I further assure that I have not presented this thesis to any other institute or university for evaluation and that it has not been published before.

Tsanova, Maria
26.6.2025

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Abstract

This Master's thesis investigates Poland's ongoing transition from fossil fuel-based energy production to renewable energy sources, with particular emphasis on the Margonin Wind Farm as a representative case study. Despite increasing commitments to environmental restoration and sustainability, Poland's entrenched dependence on coal continues to hinder the progression of renewable energy initiatives. Drawing on the theoretical frameworks of Energy Transition and Stakeholder Theory, the thesis examines the socio-economic, environmental, and institutional implications of large-scale renewable energy projects within both national and European Union contexts.

A qualitative research methodology, guided by a phenomenological approach, was implemented to explore the experiences and perceptions of Polish citizens. Participants were selected for the interviews using typical case sampling to reflect an average societal perspective on the energy transition and the Margonin project specifically. The research integrates policy analysis with empirical data to assess the wind farm's contribution to sustainable development, social equity, and national energy security.

Additionally, the study fits its findings within the broader discourse of energy democracy and EU energy governance, demonstrating how regulatory frameworks encourage citizen involvement and decentralized energy systems. The analysis identifies essential lessons for advancing renewable energy in Poland, including the need for workforce development, increased investment, infrastructure upgrades, and regulatory streamlining.

By providing a comprehensive evaluation of Poland's energy transition, this thesis highlights the social, economic, and environmental benefits of inclusive and strategically coordinated renewable energy policies.

Keywords*: Poland, European Union, Energy Transition Theory, Stakeholder Theory, Margonin Wind Farm*

Abbreviations

*in order of appearance in the text

SDGs	Sustainable Development Goals
GHGs	Greenhouse Gases
EU	European Union
RES	Renewable Energy Sources
SLO	Theory of Social License to Operate
IASS	Institute for Advanced Sustainability Studies
SEAs	Strategic Environmental Assessments
PV	Photovoltaic
cep	Centre for European Policy
EIB	European Investment Bank
GDP	Gross Domestic Product
EBRD	European Bank for Reconstruction and Development
STEM	Science, Technology, Engineering and Mathematics
GEI	Gender-Equality Index
EIA	Environmental Impact Assessment
ECHR	European Convention on Human Rights
IFC	International Finance Corporation
LCOE	Levelized Cost of Electricity
PPAs	Power Purchase Agreements
CRMs	Capacity Remuneration Mechanisms

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1. Introduction

Context

In line with the Sustainable Development Goals (SDGs), Poland aims towards environmental restoration and protection measures, which can improve the lifestyle of its citizens today as well as that of future generations. A main priority is transitioning from fossil fuel-intensive energy production towards more ecologically conscious alternatives in the face of renewables (Gnatowska & Moryń-Kucharczyk, 2019). A primary impediment to Poland's renewable energy transition is its entrenched dependence on coal as a dominant energy source. The abundance of this resource has been keeping fossil fuels as a dominant part of the country's energy mix (Gnatowska & Moryń-Kucharczyk, 2019). As it could be observed below, coal is still taking the biggest share of domestic energy production (Dusiło, 2024).

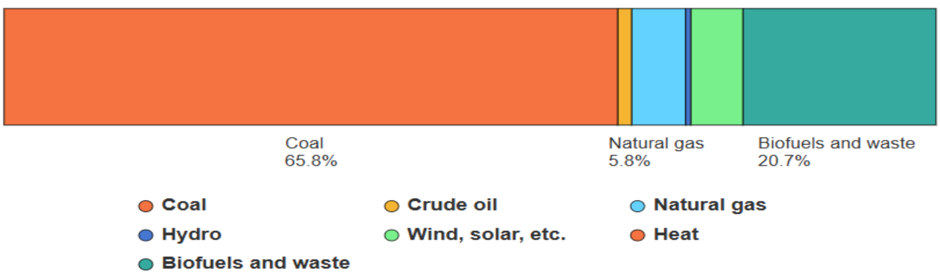

Fig. 1: Evolution of Total Energy Supply in Poland since 2000 (International Energy Agency, 2023)

Although fossil fuels came handy for Poland's energy trade after Russia declared war on Ukraine and Europe was deprived of access to Russian natural gas, they are not a long-term solution for energy security. Trade could be even more secure and efficient if domestic renewable energy projects are functioning and producing electricity to meet the population's needs (Wandysz & Davies, 2024). This is one of the main reasons why Poland is making progress in terms of its green energy transition and reduction of greenhouse gas emissions (European Commission, 2024a).

As it could be observed in the graph below, Figure 2, the evolution of domestic energy production in Poland since the 2000 is marked by a dominance of coal, although its trajectory of production is falling down. Meanwhile, the production from natural gas is stagnating and the energy production share of biofuels is rising (International Energy Agency, 2023).

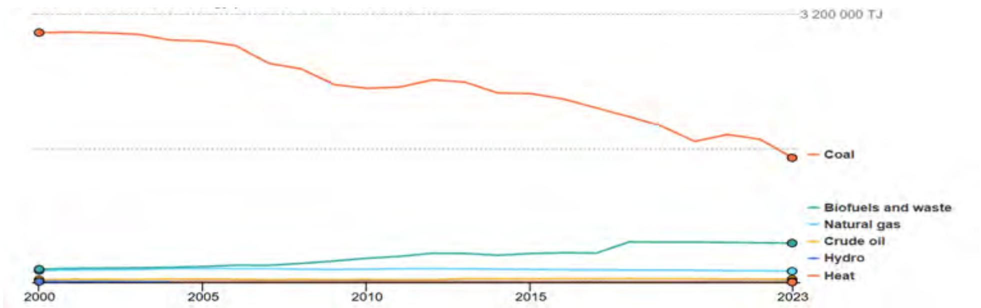

Fig. 2: Evolution of Domestic Energy Production since 2000 (International Energy Agency, 2023)

Therefore, there is a clear necessity to make significant additional efforts to achieve carbon neutrality as also shown by Figure 3 - "according to the cumulative projected net GHG emissions between 2022 and 2050 with a linear trajectory to climate neutrality by 2050, Poland shows an overshoot of 68% (i.e. cumulative projected emissions are higher than those from a linear trajectory)" (European Commission, 2023).

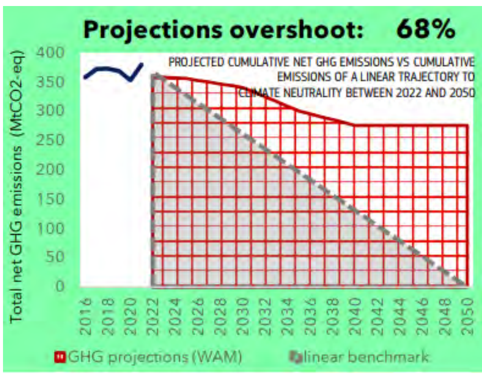

Fig. 3: Projections Overshoot of GHG (European Commission, 2023)

There needs to be a shift in mindset towards long-term value creation, which creates career, innovation, digitalisation, and health benefits for Polish citizens and this in turn increases the country's competitiveness (European Commission, 2023).

For this reason, Poland is continuously putting efforts in its green energy transition (Litwin & Jedlecka, 2025). As it could be observed below, Figure 4b shows that energy is increasingly being generated from wind, hydro, and solar power (International Energy Agency, 2023).

Wind power in particular represents the biggest share as it could be observed in Figures 4a and 4b (Low Carbon Power, 2024). The country's flat lowland relief and northern geographic location with its proximity to the Baltic Sea, predispose efficient development of wind power projects, especially in Northern and Central Poland.

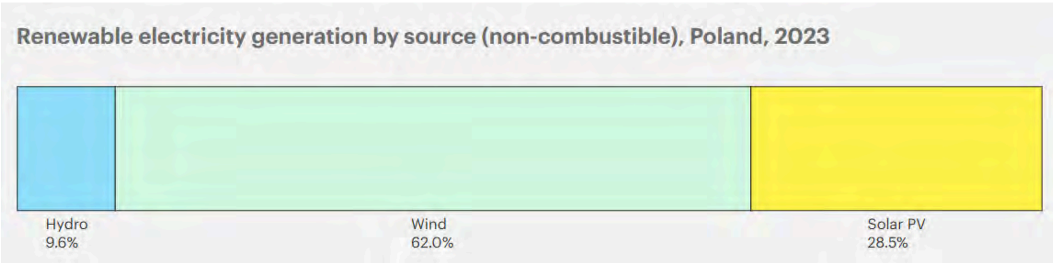

Fig. 4a: Renewable Electricity Generation by Source (Non-combustible), Poland, 2023 (International Energy Agency, 2023)

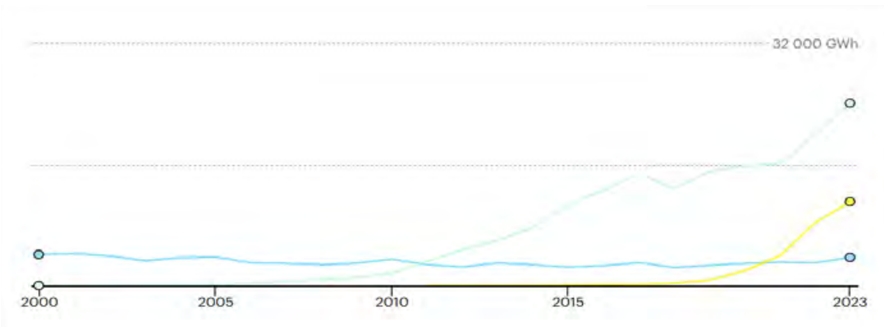

Fig. 4b: Renewable Electricity Generation by Source (Non-combustible), Poland, 2023 [Legend: Wind - green, Hydro - blue, Solar PV - yellow] (International Energy Agency, 2023)

With the increasing RES production, an increase in RES consumption follows. This trend is shown below, Fig. 5 (Dębicka, et al., 2024):

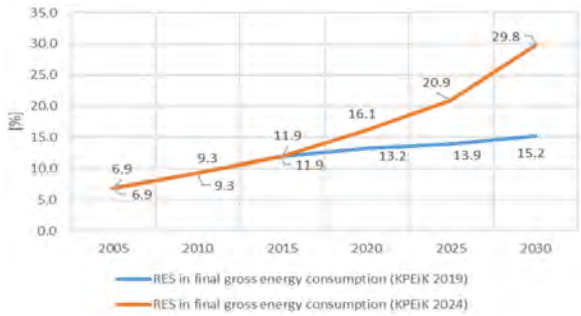

Fig. 5: Renewable Energy Sources in Final Gross Energy Consumption

(Dębicka, et al., 2024)

Research Gap

Despite ongoing efforts toward decarbonization, there remains a substantial knowledge gap regarding the effective management of the socio-economic implications of the energy transition in Poland as well as comprehensive case study analysis of successful wind energy projects (Õunmaa, 2021). Existing literature underscores persistent public resistance, particularly among communities economically reliant on coal mining, highlighting a lack of comprehensive strategies to mitigate these social tensions (Gnatowska & Moryń-Kucharczyk, 2019).

Furthermore, the transition necessitates a large-scale re- and upskilling of the current energy workforce to align their competencies with the rapidly evolving demands of the green energy sector. However, current frameworks lack specificity and scalability in addressing this challenge (Council of the European Union - General Secretariat, 2024). The absence of a coherent and evidence-based approach to renewable energy project management, coupled with insufficient mechanisms for public engagement and accountability, exacerbates the risk of implementation failures and public disengagement (Ministry of Climate and Environment Republic of Poland, 2024). This incomplete understanding hinders the development of integrative, socially just, and economically viable energy policies, thereby widening the gap between policy objectives and practical outcomes (Gnatowska & Moryń-Kucharczyk, 2019).

Solution

The Margonin Wind Farm project is significant for Poland due to its environmental preservation capabilities, geopolitical influence tied to energy security, ability to increase the share of renewables in the country's energy mix as well as its competitiveness in the European energy market. The Member State implements EU policies in alignment with the EU's environmental preservation goals and the achievement of a sustainable economy. Renewable energy projects like the Margonin present a long-term energy solution to the country but require a high initial investment. In order for an energy project to be feasible, there needs to be an efficient coordination of all stakeholders involved. From a geopolitical perspective, renewable energy sources reduce dependencies on other countries and strengthen the domestic market of the country. It is important for the country to diversify its energy sources in order to secure supply and reduce electricity prices. For this reason, Poland adopts measures at a national level, which make sure that there are no excessive burdens on households' budgets and increase in energy poverty. Additionally, there is a focus on sustainable modernization of energy systems (ENVIRON Poland Sp. z o. o., 2009).

These national priorities are included in the principles for the update of the "Poland's Energy Policy until 2040", which was adopted by the Council of Ministers in response to the Ukraine crisis and Europe's ceasing access to energy sources (Ministry of Climate and Environment Republic of Poland, 2024). Renewable energy project development comes in handy in terms of energy trade, energy security and green jobs creation (European Commission, 2024c). Additionally, it does not result in any harmful emissions and in this way protects the environment and human health, aligning with the EU's goal of carbon neutrality by 2050. The development of an energy project requires lots of effort and time due to the ecological, social, and economic variables that need to be considered. Therefore, clear corporate social responsibility requirements have to be set and all permissions (e.g. land use permission) need to be obtained before the start of the construction of the energy facility (ENVIRON Poland Sp. z o. o., 2009).

EDP Renewables is a very CSR-oriented company which has created pioneering renewable energy projects in Poland, including the Margonin Wind Farm. It is an example of international cooperation and European unity, especially since the European Investment Bank provided a big share of funds for the project (European Investment Bank, 2010).

In summary, the Margonin Wind Farm improves the understanding of the socioeconomic benefits of renewable energy power, while also representing a major sustainability success expressed in terms of producing clean energy and respecting environmental preservation, technicalities, investment structure, material goods and national heritage goods, noise and vibrations effects, waste management, legal basis, land use, visual aspects, internal and external stakeholder dialogue, and good air quality (ENVIRON Poland Sp. z o. o., 2009).

Structure of the Master's Thesis

This Master's thesis is structured in eight main chapters and an Annex answering all three sub-questions in a logical manner. **Chapter 1** explains Poland's energy mix and RES potential. **Chapter 2** presents a theoretical and empirical foundation through a Theoretical Framework and Literature Review to create rationale for analysis. **Chapter 3** is the Methodology section, presenting the implemented research approach. **Chapter 4** analyses the financing model of the project and its bases of creation related to the concepts of energy democracy and energy governance. **Chapter 5** provides an in-depth evaluation of the social, economic, and environmental benefits of the Margonin Wind Farm. Stakeholder Analysis is implemented in order to evaluate the answers acquired via interviews with various stakeholder groups. **Chapter 6** discusses project-specific and broader policy recommendations. Then project-specific recommendations aim towards objectivity, while the broader policy recommendations present the case study of the Margonin Wind Farm as an exemplary one with wide applicability to the energy sector in Poland and EU's decarbonisation goals. The Conclusion, **Chapter 7,** summarises in a cohesive and clear manner all main arguments of the thesis. The main takeaway established at the end of the thesis is that the Margonin Wind Farm project is beneficial at national and international level due to its economic value and environmentally and socially conscious creation and functionality - a real example of innovativeness and technological advancement (ENVIRON Poland Sp. z o. o., 2009). **Chapter 8** contains the 69 sources used to write the thesis cited in Harvard style. An **Annex** attached in the end presents detailed responses of the interviewees.

2. Theoretical Framework and Literature Review

2.1 Theoretical Framework

The goal of creation of the Margonin Wind Farm in Poland as well as its impact on a national and international level could be explained via the Theory of Energy Transition and Stakeholder Theory. Socio-economics of large-scale renewable energy projects and sustainability aspects characterising the development of such projects are also analysed in favour of increased objectivity and informativeness of the Master's thesis.

2.1.1 Energy Transition Theory

The sustainable energy transition represents a fundamental change in the production, distribution, and use of energy, focused on phasing out fossil fuels in favor of a system built around renewable energy sources. It constitutes a comprehensive socio-technical transformation that prioritizes principles of equity, inclusivity, and human development. Central to this paradigm is the concept of a just transition, which seeks to ensure distributive and procedural fairness in the shift toward sustainable energy systems, particularly for labor forces in fossil fuel-dependent industries and socioeconomically vulnerable populations disproportionately affected by increasing living costs and energy insecurity (United Nations Development Programme, 2025). This transition is essential for addressing the issue of climate change, given that fossil fuel emitted gases such as carbon dioxide and methane, are very harmful (United Nations Development Programme, 2025).

Beyond its environmental imperatives, the sustainable energy transition serves as a catalyst for systemic innovation, employment generation, and the mitigation of energy poverty. It offers a strategic framework to address intersecting global challenges, including disparities in energy access, threats to energy security, social inequality, and adverse public health outcomes. Through integrated and transformative policy mechanisms, this transition lays the groundwork for a resilient, equitable, and sustainable future (United Nations Development Programme, 2025).

Moreover, the Energy Transition Theory is based on the innovation model. The innovativeness is expressed in moving towards a more environmentally and socially friendly approach. There can be defined three types of models explaining this theory:
1. Neoclassical Innovation Model; 2. Evolutionary Innovation Model; 3. Social Innovation Model. Firstly, the Neoclassical Innovation Model explains the energy transition as market-driven and based on technological newness (Gabriela & Segura, 2024). According to the Evolutionary Innovation Model, innovations represent continuous generation of new products, processes and forms. They are a result of an adaptation response to the environment. Finally, the Social Innovation Model aims to solve social needs with the goal of active involvement of underproved groups (Gabriela & Segura, 2024). Therefore, according to the Energy Transition Theory, accelerating the decarbonization of the energy sector through large-scale deployment of renewable energy technologies is essential for both mitigating greenhouse gas emissions and enhancing energy access in underserved regions (United Nations Development Programme, 2025).

The tie between innovation and technological development is critical because in order for the energy transition to occur, multiple entities and practices need to engage simultaneously, which is rooted in the complexity of the transition studies (Gabriela & Segura, 2024). Sociotechnical systems can be analyzed across three interrelated levels of complexity - the micro-, meso-, and macro-levels:

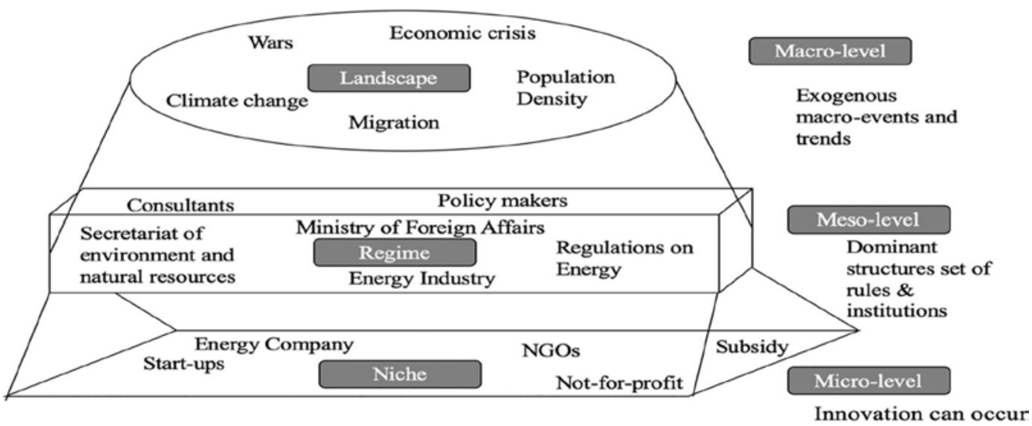

Fig. 6: Three Complex Levels in Sociotechnical Systems (Gabriela & Segura, 2024)

According to these three levels, the energy transition is based on “shifts in energy security, geopolitical structure, energy power, energy justice, and energy governance, which receive relatively less attention in current literature” (Yang, et al., 2024). The shift to renewable sources could be defined as structural - it is a shift of dominance with technologies being used to exploit the RES capacity (Yang, et al., 2024).

The energy transition constitutes a spatially contingent process marked by the restructuring of established geographical configurations of economic and social practices:

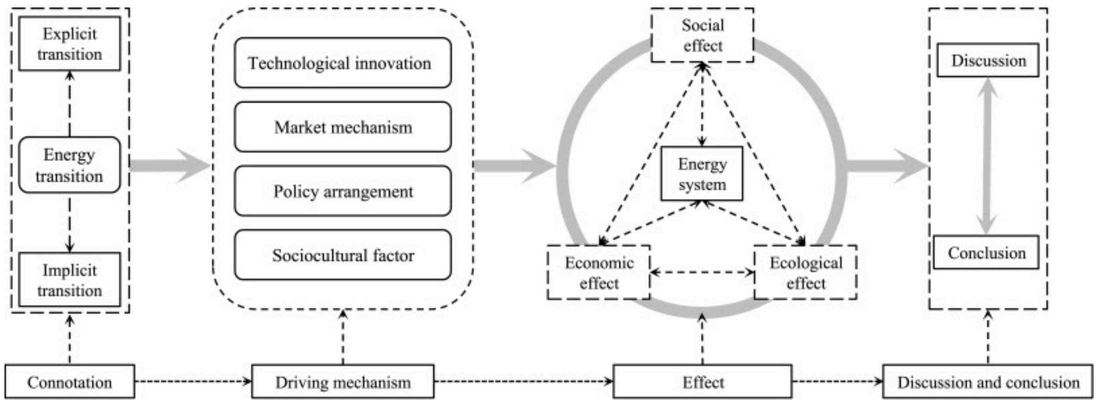

Fig. 7: The Intertwined Mechanisms of Energy Transition and Multi-dimensional Ramifications

(Yang, et al., 2024)

The dual connotations, explicit and implicit, have to do with the concept that there are various interacting elements including but not limited to the energy sector (Yang, et al., 2024). The explicit transition is typically reflected in statistical data and indicators, such as the type, structure, and form of energy use, as well as transportation methods and spatial distribution. In contrast, the implicit transition encompasses changes in areas like energy security, geopolitical dynamics, energy influence, justice, and governance (Yang, et al., 2024). Therefore, the Energy Transition Theory explains the process as requiring multidisciplinary insights from domains in evolutionary economics, institutional economics, and technological studies (Gabriela & Segura, 2024).

2.1.2 Stakeholder Theory

As the energy field keeps developing and growing, there is an increased involvement of various stakeholders. Stakeholder Theory explains the dynamic of their interactions and dependencies as well as their influence on the outcome of the renewable energy project (Sustainability Directory, 2025). It argues that organizations ought to account for the interests of all stakeholders, not solely shareholders, when making decisions. Applied to the energy transition, this approach requires balancing investor priorities alongside the needs of local communities, workers, and environmental conservation (Sustainability Directory, 2025). There could be identified key stakeholder groups in the energy transition based on how they "can affect or be affected by the change" (Sustainability Directory, 2025). These key stakeholder groups are governments, energy companies, consumers, local communities, investors, environmental organisations, and indigenous people (Sustainability Directory, 2025).

To begin with, the role of **governments** is to establish frameworks through policies, regulations, and financial incentives to guide the energy sector (Sustainability Directory, 2025). **Energy companies** are responsible for designing, building, and managing energy systems and infrastructure (Sustainability Directory, 2025). **Consumers** rely on energy for daily needs and are directly influenced by its price and accessibility (Sustainability Directory, 2025). **Local communities** are connected to the sites for energy developments and are directly impacted by both the benefits and disruptions these projects bring (Sustainability Directory, 2025). **Investors** supply the funding necessary to initiate and sustain energy initiatives (Sustainability Directory, 2025). **Environmental organizations** work to promote sustainable energy solutions and hold stakeholders accountable (Sustainability Directory, 2025). Finally, **Indigenous people** often possess distinct rights, perspectives, and traditional knowledge concerning land, ecosystems, and natural resources (Sustainability Directory, 2025). The involvement of all of these groups is directly linked to social and environmental justice (Robichaud, 2023).

Challenges outlined by the Stakeholder Theory include establishing a continuous and enduring record of stakeholder interactions and power imbalances, ensuring clear, effective, and timely communication, especially in cases of lack of trust, using resources efficiently and strategically, and showing accountability and adherence to legal and regulatory requirements (Robichaud, 2023).

Stakeholder engagement is a vital component of a fair and effective energy transition, ensuring that diverse perspectives are included in decision-making processes. It helps build trust and legitimacy by fostering transparency, enabling stakeholders to understand project goals and express their concerns, which in turn creates a sense of shared ownership (Sustainability Directory, 2025). Engaging stakeholders early and consistently also reduces the risk of conflict and delays by addressing issues before they escalate (Sustainability Directory, 2025). Moreover, input from communities such as Indigenous groups, can significantly enhance project design by highlighting potential environmental or social impacts that might otherwise go unnoticed (Sustainability Directory, 2025). Meaningful engagement also promotes equity, helping to identify and protect vulnerable populations while ensuring that the benefits of the energy transition, such as employment opportunities and cleaner air, are fairly distributed. Finally, collaboration among a wide range of stakeholders often sparks innovation, leading to new technologies, policy solutions, and business models that can accelerate the shift to sustainable energy systems (Sustainability Directory, 2025).

Stakeholder engagement should be treated as a continuous process that spans the entire lifecycle of an energy project - from planning through to decommissioning (Dhar, et al., 2020). Early involvement during the planning and development stages helps identify potential challenges, refine project design, and foster community support. Maintaining dialogue during construction and operation ensures that emerging concerns are addressed and managed effectively. Even at the end of a project’s life, engagement remains critical to ensure proper site restoration and to address any lasting effects on communities or the environment (Sustainability Directory, 2025).

Advancing stakeholder engagement in the renewable energy field requires the development of new methods that are more inclusive, participatory, and impactful. Embracing technology such as online platforms, virtual reality, and artificial intelligence can improve how stakeholders interact with projects and each other. At the same time, it is essential to build the capacity of all participants by equipping them with the skills, knowledge, and tools needed to engage effectively throughout the process (Sustainability Directory, 2025).

The Stakeholder Engagement Theory is supported by the **Theory of Social License to Operate (SLO)** and the **Theory of Deliberative Democracy** (Sustainability Directory, 2025). According to SLO, there is a necessity of "ongoing acceptance, approval and support from communities and/or stakeholders" (Stuart, et al., 2023). It tackles the issue of negative environmental and social externalities (Stuart, et al., 2023). Meanwhile, the Theory of Deliberative Democracy holds that political decisions should emerge from open, fair, and thoughtful dialogue among citizens. In this deliberative process, individuals share perspectives, weigh different arguments, and consider various viewpoints with the aim of promoting the common good. Through such discussions, citizens can collectively determine which policies, actions, or procedures are most likely to serve the public interest (Eagan, 2016). Therefore, the Stakeholder Theory supported by the Theory of Social License to Operate (SLO) and Deliberative Democracy, advocates for continuous stakeholder interaction practices in favour of the common well-being and progress (Sustainability Directory, 2025).

2.1.3 Theoretical Overlap

The Energy Transition Theory overlaps with the Stakeholder Theory in a way that highlights the importance of inclusive decarbonisation with multi-actor involvement. The green energy transition consists in a behavioral change, which immediately ties the human dimension to the energy field and the changes it undergoes (Steg, et al., 2015). The behavioral aspects of the sustainable energy transition entail comprehensive modifications across multiple dimensions of energy-related behavior, including the integration of renewable energy sources, the deployment of energy-efficient technologies, strategic investments in building energy performance, and transformations in both direct and indirect energy consumption practices (Steg, et al., 2015).

Three primary determinants influence sustainable energy behaviors: cognitive factors (such as knowledge and awareness), motivational drivers (including values, attitudes, and intentions), and contextual conditions (such as social, economic, and infrastructural factors) (Steg, et al., 2015). Addressing public misperceptions regarding the relative contributions of various activities and processes to global warming is essential to acknowledge the harmful anthropogenic influence and realize that renewables are the logical long-term solution. It is crucial to develop and empirically evaluate behavioral interventions aimed at reducing household CO_2 emissions, encompassing strategies such as informational campaigns, economic incentives, regulatory measures, and the adoption of low-carbon technologies (Steg, et al., 2015). The adoption likelihood of sustainable innovations, such as renewable energy systems, tends to increase when consumers perceive their symbolic value more positively - that is, the degree to which these technologies convey favorable social and environmental impact (Steg, et al., 2015). Therefore, the Energy Transition Theory is connected to the Stakeholder Theory in a way which puts human perception and influence at the forefront so that it can become an engine of the green energy transition (Steg, et al., 2015).

2.2 Literature Review

2.2.1 Socio-economics of Large-scale Renewable Energy Projects

Large-scale renewable energy projects should be aligned with the three laws of energy transitions in order to be beneficial from a socio-economic perspective. These laws are of universal nature which promotes international applicability with the goal of avoiding speculative estimates (Bashmakov, 2007). According to the first law, "in the long-term, energy costs to income ratios are relatively stable with just a very limited sustainable fluctuation range" (Bashmakov, 2007). The second law says that the "growing overall economic productivity requires a better quality of energy services" (Bashmakov, 2007). Finally, according to the third law, "as energy quality improves against relatively stable energy costs to income ratios, energy productivity grows, or energy intensity declines" (Bashmakov, 2007). These three laws should stimulate socio-economic value creation. Sustainable energy alternatives are perceived differently according to the degree of their social value utilisation (Bashmakov, 2007).

When it comes to this type of value optimization, the role of renewable energy is strategically aligned with the need of achieving decarbonisation quickly and efficiently, while also stimulating value creation. The created benefits are not limited to climate change mitigation and adaptation strategies (Institute for Advanced Sustainability Studies (IASS), 2017). They include increasing the potential of business fields and productivity, creating job opportunities, and tackling development challenges. Such challenges could include, for instance, energy poverty and a lack of energy access, and are subject to solutions via regenerative energy technologies (Institute for Advanced Sustainability Studies (IASS), 2017).

From a socioeconomic perspective, there are certain characteristics that could be evaluated to estimate the degree of advantage created by renewable energy sources. To begin with, one could look into the level of value creation. When measured economically, its effects are defined to be achieved at various levels from a local, national, and international perspective. There could be an unequal distribution of value creation from a regional perspective. Nevertheless, although the creation could not be equal from economic measures' perspective, it is still felt in other ways. For example, the reduction of air pollution results in better health and general lifestyle improvement, especially for people suffering from chronic diseases such as asthma. This is linked to significant lifestyle improvement for those affected (Institute for Advanced Sustainability Studies (IASS), 2017).

Furthermore, there could be defined system boundaries in economic terms. The chain of value creation is supported by the development of a renewable energy project. According to the system boundaries, different parts of the value chain could be project planning, manufacturing installation, grid connection, operation, maintenance and commissioning. Optimization could be achieved via the support of effective policies, financial access, up- and reskilling of employees, innovation, and research. The availability of all of these additional factors is dependent on the development status of a country (Institute for Advanced Sustainability Studies (IASS), 2017).

The effects created by the socio-economics of renewable energy projects are categorized based on their scope and are divided into direct, indirect, and induced, depending on how they influence national economic accounts. Direct effects pertain to industries and consumers that are consistently and directly impacted. Indirect effects result from activities in related sectors along the supply chain, including both upstream and downstream industries (Institute for Advanced Sustainability Studies (IASS), 2017). Beyond these, induced effects also occur. These encompass a range of secondary impacts, such as substitution effects, changes in prices, shifts in budget allocations, variations in income, effects on foreign trade, dynamic influences, and other related consequences. Additionally, a distinction is made between the macroeconomic gross effects, the sum of effects in the RES industry from a sectoral perspective, and net effects - the sum of effects on the economy as a whole (Institute for Advanced Sustainability Studies (IASS), 2017).

The socio-economic advantages of renewable energy tend to benefit different groups compared to those of fossil fuel-based energy. Renewable energy is particularly well-suited to support policy objectives, for instance, such as rural development, reducing poverty, and expanding access to energy (Institute for Advanced Sustainability Studies (IASS), 2017).

Therefore, the study of socioeconomic-economics of large-scale renewable energy projects points out that economic development, stability and resilience of energy supply, environmental improvements at the local and regional levels, public health advantages, reduction of greenhouse gas emissions and climate risk mitigation are among the advantages to society created via regenerative sources and emphasized the need to incorporate various energy options into a country's energy mix (Institute for Advanced Sustainability Studies (IASS), 2017).

2.2.2 Sustainability in the Development of Large-scale Renewable Energy Projects

The concept of sustainability in the development of large-scale renewable energy projects is based on the goal of the Paris Agreement aiming to prevent global temperatures from exceeding 1.5°C (Environmental Defenders Office, 2025). For this goal to be met, the energy system must undergo a significant transformation from fossil fuels usage to renewable energy (Environmental Defenders Office, 2025). This shift to renewable energy offers a chance to approach environmental issues, stimulate community engagement, and foster the protection of cultural heritage in a more respectful and inclusive manner than has not traditionally been the case with fossil fuel and mining developments (Environmental Defenders Office, 2025). Legal frameworks have to be structured to achieve positive outcomes for climate, biodiversity, and local communities. Large-scale RES projects are connected to the rapid greenification of the energy field (Environmental Defenders Office, 2025).

However, their creation should be based on scientific measures and international collaboration in order to be truly sustainable. All decisions, planning processes, and activities related to renewable energy transition projects must be fully aligned with human rights protection obligations (Environmental Defenders Office, 2025). This includes the recognition and implementation of the right to a clean, healthy, and sustainable environment, as well as adherence to core environmental justice principles. Policy frameworks must prioritise the rights and needs of disproportionately affected communities (Environmental Defenders Office, 2025). These communities must be meaningfully consulted and actively involved in decision-making processes. These consultations need to be culturally and ethically appropriate and create the sense of community to optimise engagement. A result would be the prevention of disputes over land access, project delays, and increased expenses. Moreover, the development of renewable energy projects should follow the core values of ecologically sustainable practices. This includes taking a cautious approach in the face of uncertainty, protecting biodiversity, and ensuring fairness between current and future generations (Environmental Defenders Office, 2025).

Decisions must rely on the most reliable scientific information available, and when there is uncertainty, a precautionary approach should be taken to prevent possible environmental damage. The location of renewable energy initiatives is key to community and biodiversity preservation (Environmental Defenders Office, 2025). For this reason, projects should be determined through early, strategic consultation within a broader planning framework aligned with emissions reduction targets and thorough data analysis based on environmental sensitivity mapping. Regional planning tools and comprehensive strategic environmental assessments (SEAs) should be used to gather detailed environmental, ecological, hydrological, and cultural data for proposed development areas, alongside data on renewable energy and transition mineral resources. Development on previously disturbed or degraded land should be prioritised, including existing infrastructure corridors, while avoiding impacts on areas with cultural significance, including intangible heritage. These tools should identify and exclude environmentally and culturally sensitive areas such as national parks, World

Heritage sites, wetlands, and critical habitats and assess and mitigate cumulative environmental and social impacts (Environmental Defenders Office, 2025).

Renewable energy transition projects must clearly demonstrate how they will avoid, reduce, or limit within defined thresholds any impacts on natural surface and groundwater systems (Environmental Defenders Office, 2025). This applies to all stages of the project, including site preparation, construction, operation, maintenance, and associated activities. Projects must include fully funded plans for site rehabilitation, environmental restoration, and material recycling to address the entire lifecycle of renewable energy developments. These commitments should be secured early in the project approval process to ensure proper restoration at project completion (Environmental Defenders Office, 2025). For transition minerals, policies should prioritise recycling and reuse, integrating these strategies into resource demand forecasts instead of relying solely on continued extraction (Environmental Defenders Office, 2025). Finally, a renewable energy project should meet the legal requirements set by binding due diligence. These obligations must ensure that companies actively identify potential risks of environmental damage and human rights violations linked to their operations as well as those arising from the actions of their subsidiaries, contractors, business partners, and throughout their supply and value chains (Environmental Defenders Office, 2025).

2.3 Summary

Energy transition is the process of ceasing to generate energy from fossil fuels (oil, natural gas, coal) and proceeding with regenerative sources (wind power, PV, etc.). Poland is a country under this process of transformation with an energy mix still currently heavily reliant on fossil fuels but also characterised with significant potential for renewable energy development. The country strives towards optimising this potential in favour of ecologic preservation and social well-being. This goal is supported via green energy policies and improved cost competitiveness (Yang, et al., 2024). After all, climate change mitigation and adaptation has become increasingly important for the protection of current and future generations and is directly tied to the production of harmful greenhouse gas emissions by non-renewable sources (Environmental Defenders Office, 2025).

Reducing these emissions results in climate resilience and long-term prosperity. Geopolitical disruptions, notably the abrupt cessation of Russian natural gas supplies amid the Ukraine conflict, have intensified the imperative for accelerated decarbonisation by reframing it as a matter of energy security (Harichandan, et al., 2022). Renewable energy technologies have the capacity to deliver vital services such as enhanced healthcare, improved educational outcomes, and affordable digital connectivity. This is life-changing to populations lacking access to reliable electricity. Furthermore, regenerative sources contribute to job creation and play a significant role in alleviating energy poverty. Thus, the energy transition is inherently complex and multidimensional in terms of its benefit creation (Harichandan, et al., 2022).

The multifaceted nature of renewable energy is explained via the Theory of Energy Transition and Stakeholder Theory. They put an emphasis on innovativeness, digitalization, synchronisation of values and priorities and increased and simultaneous engagement among multiple entities and practices. In this way governments, consumers, local communities, investors, environmental organisations, and indigenous people come together to advocate for sustainability and environmentally and socially conscious projects. A commitment to sustainability in the present fosters the development of a more environmentally resilient and ecologically balanced future (Environmental Defenders Office, 2025).

3. Methodology

The Master's thesis at hand explores the question "How does the Margonin Wind Farm Energy Project impact the Socioeconomic Development of Poland?". Poland is the country of focus because it represents significant progress from energy, water management, and infrastructure perspectives. Nevertheless, the country is still subject to development in each of these aspects, and its ambitious efforts are driven by the goal of social well-being and environmental conservation which respects the Sustainable Development Goals. The thesis focuses on one energy project and analyzes its conception, management, and effects in detail. Since the wind energy sector is well developed in Poland and therefore represents a big portion of the electricity production of the country with potential for further development, this type of energy generation is inspected. The chosen project for in-depth analysis is the **Margonin Wind Farm** - a project by EDP Renewables.

Sub-questions are:

1. Which processes are involved in the development and creation of the Margonin Wind Farm?

2. In which ways does the Margonin Wind Farm influence the socioeconomic development of the country?

3. Is this energy project an example of innovation and how relevant is it in terms of Poland's green energy transition?.

The three sub-questions effectively inspect all stages of the development of an energy project: 1. project potential assessment (data collection and opportunity assessment), 2. project options identification (strategy and detail), 3. project refinement (planning and development), 4. project implementation (financing and construction), 5. project operation, maintenance, and decommissioning (U.S. Department of Energy - Indian Energy, 2025). The conducted research aims to investigate the sub-questions in detail and eventually prove that the Margonin Wind Farm is an example of innovation and sustainable development from the project's planning to its implementation stage - that it functions in a socially and environmentally conscious way.

The research process was initiated via document extraction based on keywords in titles and abstracts in the context of both the EU and its Member State Poland specifically. They were filtered based on relevance and trustworthiness. Primary sources were used such as factsheets published by the EU bodies (e.g. GHG emissions of Poland) as well as reports by EDP Renewables as the company initiator of the project (e.g. Environmental and Social due diligence of the Margonin Wind Farm project, Environmental permit, Technical and Non-Technical Assessment). Secondary sources such as scientific papers and online academic articles were utilized to analyze the factual information at hand. Tertiary sources were considered but did not prove to be necessary for the goals of the research. The research approach implements various sources due to the complex nature of the renewable energy field shaped by the interactions between various stakeholders.

The basics of the research process undergone to create the Master's thesis could be illustrated with the research scheme below:

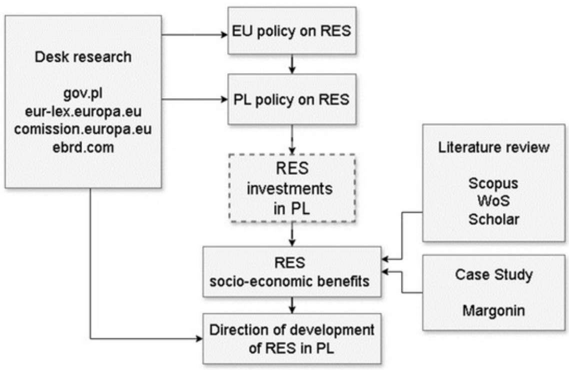

Fig. 8: Research Scheme

(Dębicka, et al., 2024)

The work starts with a general elaboration of the geographic location, relief, and rate of development of Poland, since these factors affect its energy sector. This is followed by an analysis of Poland's current energy mix - opportunities and challenges will be outlined. This naturally brings up the idea that renewables are the feasible future-oriented solution for the country. A specific example of a successful wind energy project is given - the Margonin Wind Farm, one of the biggest wind power energy projects in Poland. Its initiator, EDP Renewables, and this company's good CSR practices as well as business approach based on international cooperation are explored. The project factors that are analyzed include but are not limited to: environmental impact assessment (flora & fauna), technical summary, investment structure, material goods and national heritage goods, noise and vibrations, waste management, legal basis, land use, visual aspects, internal and external stakeholder dialogue, and air quality. Throughout the analysis of these factors, the socioeconomic impact on Poland is inspected. The conclusion that renewable energy projects benefit Poland from socioeconomic perspective with the notable example of the Margonin Wind Farm, is reached.

Comprehensive Internet and literature search was conducted in favor of the Master's thesis accuracy and coherence. For the goal of objective data collection, a series of interviews were held with a maximum of seven questions per stakeholder category. These categories encompass both the public and private sectors. The stakeholders were contacted via email for an "interview". Their detailed responses are attached to the thesis with an Annex, while the thesis itself includes a summary of trends and analysis.

Four private Polish citizens were interviewed, including:

1. Patryk Frąckowiak
2. Darya Nedabeha
3. Salminaz Khudiyeva
4. Julia Gorzelańczyk

For the achievement of full objectivity, independent energy experts were interviewed as well:

1. André Wolf (Policy Analyst at the Centre for European Policy (cep)

Investor relations were also inspected closely:

1. Heike Freimuth (Head of the EIB Group Office in Germany)

The Master's thesis could be defined to integrate institutional, policy, and renewable project analyses. Qualitative methods are used for the purpose of experiences and perception studies. The approach of phenomenology was implemented when private Polish citizens were interviewed about the Polish energy field and their opinions of the project in particular. This approach pays attention to the individual. The individuals who participated in interviews were selected based on typical case sampling - in this way, the views of the average Polish citizen could be inspected (National Library of Medicine, 2022). Furthermore, the interviews of all categories of stakeholders were structured with a predetermined number of questions, which have to do with all key aspects related to their perception of or role in the energy field (National Library of Medicine, 2022). A detailed description of the project Margonin Wind Farm, its impact on local communities as well as its meaning for the energy field in Poland was created to test the research hypothesis that the socioeconomic impact of the energy project is beneficial (National Library of Medicine, 2022). The scientific research as well as the conducted interviews reflect the qualitative concepts of credibility, transferability, dependability, and transferability. No issues of concern such as the Hawthorne effect, Observer-expectancy effect, or Artificial scenario effect were observed (National Library of Medicine, 2022).

The choice of a qualitative type of research method is based on the provision of critical insights into the social, cultural, and institutional contexts that shape renewable project outcomes (Wüstenhagen, et al., 2007). These insights are relevant to the three dimensions of social acceptance of renewable energy projects: "socio-political, community and market acceptance" (Wüstenhagen, et al., 2007). While quantitative approaches effectively measure technical and economic performance, they often overlook the human dimensions of energy transitions. Qualitative tools enable researchers to explore stakeholder perspectives, understand community attitudes, and identify underlying social dynamics that influence public acceptance and project success (Wüstenhagen, et al., 2007). Moreover, qualitative approaches support more inclusive and participatory decision-making by incorporating local knowledge and lived experiences, fostering greater trust and legitimacy in the planning process (Aitken, 2010). As such, qualitative methods not only complement quantitative data by explaining underlying motivations and conflicts but also enhance the comprehensiveness and social relevance of renewable energy assessments (Aitken, 2010).

The thesis is based on both researched and new relevant topics of consideration. On one hand, it builds on existing research in terms of the value of renewable energy and its applicability to the everyday lives of citizens. On the other hand, it also examines the current topics of re- and upskilling in the energy field, the personal value creation of green jobs and the way it contradicts public resistance, the functionality of the project Margonin Wind Farm, and its impact on Polish society as an exemplary case.

Limitations of this Master's thesis consisted of the lack of availability of numerical statistical data to measure welfare creation. For instance, the co-benefits of renewable energy projects, apart from impacts on employment and gross domestic product (GDP), are seldom measured, quantified, or monetized (Institute for Advanced Sustainability Studies (IASS), 2017). Moreover, the thesis represents more so a scientific and informed guess on how the future developments should look like in the key areas of policy frameworks, Polish infrastructure expansion, the changing landscape of renewable energy, and future demand. These limitations were addressed via the integration of the energy project's life cycle development and detailed critical assessment of currently implemented energy and climate policies. A high number of scientific sources were consulted to achieve sufficient and multifactorial information gathering about the topic at hand.

4. Analysis

4.1 Energy Democracy

The concept of energy democracy has evolved through time and has become more and more relevant to decision-making procedures in the energy field and the art of policymaking. It is based on the recognition of various advantages of active citizen involvement in energy and climate affairs. For instance, it tackles the issue of resistance. Additionally, it stimulates more effective and equitable governance. Therefore, energy democracy is tied to value establishment and prioritization (Szulecki & Overland, 2020). From an exogenous point of view, there are three driving factors for the demand for energy democracy - climate change, shifts in the energy market, and advancements in technology. Characterized by its interdisciplinary foundation and advanced by a diverse group of "human geographers, sustainability scholars, legal scholars, and political scientists" (Szulecki & Overland, 2020), the energy concept is further shaped by the particularities of national and regional contexts (Szulecki & Overland, 2020).

There are three different ways to perceive energy democracy. Firstly, it could be looked at as a process - a dynamic driven by localized grassroots efforts and a cross-border social movement that confronts dominant actors in the energy sector (Szulecki & Overland, 2020). Secondly, it could be inspected as an outcome of decarbonisation. In other words, the greater the shift toward renewable and decentralized systems, the more democratized the sector becomes (Szulecki & Overland, 2020). Thirdly, it could also be a normative goal - an envisioned ideal for a future shaped by decarbonisation, though not yet clearly defined (Szulecki & Overland, 2020).

The integration of energy and environmental regulation driven by the imperative of climate change mitigation, along with the growing diversity of stakeholders in the energy system, marks a shift towards democratisation of energy. It is a method of making binding collective decisions that align those decisions with the interests and perspectives of the individuals whose behavior is governed by them (Szulecki & Overland, 2020). The translation of this method in energy governance mechanisms is necessary to achieve the goal of decarbonisation, especially since the term “energy democracy” is becoming increasingly important in global policy development (Szulecki & Overland, 2020).

4.2 Energy Governance

The European Union’s regulatory architecture fosters active prosumer involvement, encourages consumer co-ownership structures, and supports the proliferation of community-driven energy projects (Szulecki & Overland, 2020). This promotion of values concerns the concept of energy governance of EU institutions and the resulting energy policy objective setting. There are four approaches under the domain of energy governance, which aim at setting a more precise definition of this concept (Tabrizian, et al., 2024). To begin with, the managerial selection approach views governance as the method through which political leaders are chosen. Meanwhile, the organizational hierarchy approach sees governance as emerging from grassroots structures and autonomous arrangements within civil society (Tabrizian, et al., 2024). To add, the network administration approach understands governance as a web of interrelated activities operating within structured hierarchies or coordinated markets (Tabrizian, et al., 2024). Finally, the language game approach defines governance as a discursive system that produces varied meanings and formalizes ideas, sometimes neglecting political and cultural influences. These approaches create a comprehensive evaluation of energy affairs with the end goal of social welfare maximization (Tabrizian, et al., 2024).

Benefit creation is dependent on the availability of monetary resources. Strong exercise of energy governance links policy objectives to energy finance. The finance determines the trajectory of investment, which could go in either fossil-fuel or regenerative source’s based direction and, therefore, significantly influence the country’s energy mix (Newell, 2011). It is essential that the trajectory of energy finance is aligned with decarbonisation priorities in order for carbon emissions to be mitigated (Newell, 2011). Citizen participation should not be overlooked for monitoring purposes. Finally, the mobilisation of private and public financing supports the optimisation of renewable energy capacity as exemplified by the Margonin Wind Farm. Therefore, effective energy governance fosters democracy and social consciousness, which favours sustainability measures (International Renewable Energy Agency, 2016).

4.3 Project Funding

Renewable energy projects require a high initial investment. For the goal of project development and full operational capacity achievement, EDP Renewables formed a finance structure agreement with the European Investment Bank ("EIB"), the European Bank for Reconstruction and Development ("EBRD"), commercial banks, and the private sector (European Bank for Reconstruction and Development, 2014).

4.3.1 European Investment Bank

Alignment with Sustainable Development Goals

The Resolution "Transforming our World: the 2030 Agenda for Sustainable Development" was adopted in 2015 by the United Nations and seeks to strengthen universal peace and prosperity for all. This ambition is outlined specifically via the 17 Sustainable Development Goals, which have to do with three dimensions of prosperity. These dimensions are environmental, economic, and social and reflect the 5Ps: People, Planet, Prosperity, Peace and Partnership (UN General Assembly, 2015). In line with its commitment to inclusivity and sustainable development, the European Investment Bank navigates its practices by prioritising the respect for SDG 1 "no poverty", SDG 3 "good health and well-being", SDG 7 "affordable and clean energy", and SDG 8 "decent work and economic growth" (European Investment Bank, 2023, p.11). The bank's energy sector involvement is aligned with the goals of the Paris Agreement. This is tied to the bank's policy of investing in initiatives meeting long-term priorities such as "energy grids, infrastructure enabling sector integration and innovation" (European Investment Bank, 2023, p.13). When it comes to the technical requirements, they are implemented in the bank's lending policy with greenhouse gas emissions reduction criteria in mind. This criteria is outlined in Directive (EU) 2018/2001 and Directive (EU) 2009/30. Therefore, the energy project selection process for investment by the European Investment Bank goes hand in hand with the prioritisation of the fulfillment of the Sustainable Development Goals (European Investment Bank, 2023).

Financing Mechanism of the European Investment Bank

From the perspective of EIB, substantial financial volume has been designated to the area of renewable energy already and there has been a marked acceleration of the Polish green transition via wind energy. The financing strategy is beneficial for various reasons including long-term energy investment stimulation and tailored timeframes (European Investment Bank, 2023).

The European Investment Bank has funded the Margonin Wind Farm energy project specifically with about PLN 178 million (EUR 45 million) with the goal of reducing CO2 emissions (European Investment Bank, 2010). Its financing role comes from its function as a climate action financier. EIB's lending policy is based on four main priorities: unlocking energy efficiency, decarbonising energy supply, supporting energy technologies and new types of energy infrastructure, securing the enabling infrastructure (European Investment Bank, 2023, p.3). The EIB-added value is not simply financial. The financing provider aims to optimize environmental and social sustainability requiring project compliance with its own standards in that regard. The values could be outlined as follows: "contribute to the protection of the environment, human well-being, human rights, gender equality, combating climate change and promotion of sustainable development" (European Investment Bank, 2018, p.9).

EIB aims to tackle the issue of market failures in the energy field and promote market functionality in the EU. A failure occurs when an investment decision is made without full compliance with climate and energy policy. Examples include but are not limited to environmental externalities such as CO2 emissions, lack of liquidity in markets, imperfect competition in electricity grids, informational barriers among smaller actors, and lack of efficient coordination between Member States (European Investment Bank, 2018, p.14).

General Steps of EIB's process of investing in a green energy project:

1. Establish contact with relevant local authorities, including ministries and other stakeholders;
2. Ensure high visibility and promote the initiative effectively;
3. Conduct thorough due diligence, including financial, technical, and investor-related aspects and socio-ecological aspects;
4. Follow a structured due diligence process examining all project dimensions: economic, technical, financial, environmental, social, legal;
5. Engage with a broad range of stakeholders and potential financial partners; Evaluate the overall structure and coherence of the financial package;
6. Address comprehensive legal requirements throughout the project lifecycle;
7. Involve a risk-management team covering financial, promotional, technical, and construction aspects; Follow a multi-step approval process, beginning with a preliminary agreement to engage; Conduct a comparative analysis and prepare a financial proposal for submission to the managerial committee;
8. Negotiation;
9. Signature;
10. Disbursement;
11. Monitoring of impact;
12. Justify the involvement of a public EU institution by demonstrating the EIB's catalytic role as a promotional bank - one that cannot be fulfilled by commercial banks;
13. Highlight the EIB's value-added benefits: better financial terms (duration, longer commitment and grace period, interest rate), larger financing volumes, and the ability to catalyze/ leverage additional investment; Demonstrate the EIB's role in crowding in other financial institutions, enhancing the overall investment impact; Establish credibility and comfort for other investors through EU validation ("EU-proofed" projects); Support innovative or first-of-a-kind technologies typically avoided by traditional banks (Freimuth, 2025);

4.3.2 European Bank for Reconstruction and Development (EBRD)

The European Bank for Reconstruction and Development (EBRD) supports projects that the private sector alone cannot fully finance, provided they are based on solid banking and financial principles (European Bank for Reconstruction and Development, 2014). According to the bank's policy, the Margonin project is classified to be type "A", meaning that " it could result in potentially significant and diverse adverse future environmental and/or social impacts and issues which, at the time of categorisation, cannot readily be identified or assessed and which require a formalised and participatory assessment process carried out by independent third party specialists in accordance with the PRs" (ENVIRON Poland Sp. z o. o. , 2009). In other words, it was mandatory for the Margonin Wind Farm project to meet certain criteria first in order to receive funding from EBRD. It would be categorised as another type if it did not have social or environmental effects of any type (ENVIRON Poland Sp. z o. o., 2009).
The bank has the following process in terms of project investment:

1. Exploratory Stage
2. Passed Concept Review
3. Passed Structure Review
4. Passed Final Review
5. Board Approval
6. Signature
7. Implementation
8. Completion (European Bank for Reconstruction and Development, 2014).

The EBRD supported the Margonin Wind Farm project with 45 million euros because it helps Poland expand its renewable energy capacity and move closer to meeting the EU's green energy targets. The bank acknowledged that the project has potential to serve as a model for large-scale wind power generation in Poland, thereby encouraging further investment in the country's renewable energy sector. Additionally, the project enhances ethical business conduct standards. Therefore, the Margonin Wind Farm had to pass social and environmental compliance standards in order to receive funding from the EBRD (European Bank for Reconstruction and Development, 2014).

4.3.3 Commercial Banks

Commercial banks provided financial support of 45 million euros (Puliti, 2011) to the Margonin Wind Farm project, too (European Investment Bank, 2010).

4.3.4 Private Sector

The project Margonin Wind Farm was co-developed by Buttero Holding Limited and Relax Wind Park Sp. z o. o.. Buttero Holding Limited was registered in Cyprus on October 11, 2007 (European Bank for Reconstruction and Development, 2014). The Special Purpose Vehicle (SPV) company Relax Wind Park I Sp. z o.o. is the legal entity that holds ownership of the Margonin Wind Farm and bears responsibility for its ongoing operation and maintenance (ENVIRON Poland Sp. z o. o. , 2009). EDPR serves as the principal shareholder in the Company Relax Wind Park I Sp. z o.o. (ENVIRON Poland Sp. z o. o. , 2009). In this way, the Polish private sector had representation, too. It provided the rest of the sum necessary to complete the project. The total cost of the project is estimated to be 166 million euros (European Bank for Reconstruction and Development, 2014).

The financing of the Margonin Wind Farm could be summarised as displayed in the pie chart below:

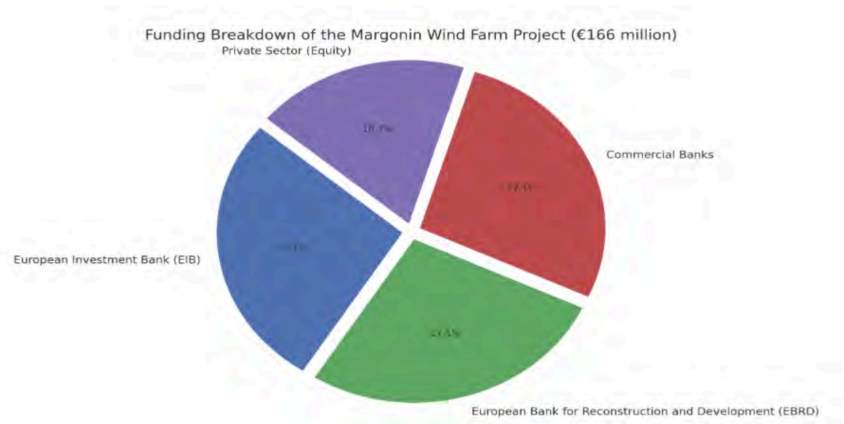

Fig. 9: Funding Breakdown of the Margonin Wind Farm Project (European Bank for Reconstruction and Development, 2014)

4.3.5 Importance of Public and Private Financing for Renewable Energy Projects

The combination of public and private funding has led to the successful development of the project Margonin Wind Farm and testifies to the necessity of collaboration between these two sectors for the optimisation of renewable energy capacity and achieving sustainability measures for large-scale renewable energy projects (International Renewable Energy Agency, 2025). Firstly, public-private partnership favours regenerative sources deployment by overcoming risks and reducing barriers such as “political and regulatory risk; counterparty, grid and transmission link risk, currency, liquidity and refinancing risk” (International Renewable Energy Agency, 2016). Secondly, such multi-sectoral collaboration contributes to the end goal of scaling up renewable energy investment rapidly (International Renewable Energy Agency, 2025).

<u>Five action areas could be identified in regards to public-private partnerships:</u>

1. To accelerate the deployment of renewable energy, it is essential to support projects from the early planning stages through to full investment maturity. This includes the provision of capacity-building initiatives, targeted preparation grants, and facilitation of linkages between project developers and potential investors (International Renewable Energy Agency, 2016).

2. Strengthening the capacity of local financial institutions is equally critical and can be achieved through the development of tailored resources, implementation of on-lending facilities, and provision of technical assistance to strengthen their participation in renewable energy financing (International Renewable Energy Agency, 2016).

3. Attracting private sector investment requires effective risk mitigation strategies, including the streamlining of administrative procedures, realignment of institutional incentives, and the development of innovative instruments to address specific risks

such as off-taker and currency risk, particularly in emerging markets (International Renewable Energy Agency, 2016).

4. Additionally, mobilising capital market investment can be facilitated through the standardisation of project documentation, tendering, and due diligence processes, as well as the expansion and aggregation of the project pipeline and the establishment of regulatory frameworks for green bond issuance (International Renewable Energy Agency, 2016).

5. Finally, the creation of dedicated financing facilities is necessary to scale up investment, enabling the issuance of risk mitigation instruments, covering transaction-related costs, and supporting the design of structured finance mechanisms, with funding drawn from diverse sources including climate finance at the national, regional, and global levels (International Renewable Energy Agency, 2016).

4.3.6 EDP Renewables

The Margonin Wind Farm was the first project that EDP Renewables developed in Poland. Comprising 60 turbines with a total capacity of 120 MW, it generates enough electricity to meet the annual needs of approximately 100,000 households. According to this data, the Margonin project remains the company's biggest project on this country's territory - bigger than EDPR's Budzyn solar farm (capacity of 15.4 MWp) and the hybrid Konary solar farm (capacity of 45 MW) (EDP, 2025b).
EDPR's financial deleveraging strategy is closely aligned with the application of stringent financial criteria in investment decision-making, the timely implementation of projects, and a growth model governed by robust risk management principles (EDP, 2025a). EDPR maintains a robust liquidity position by prioritizing competitively priced committed credit facilities over cash holdings and securing coverage for refinancing needs 12 to 24 months in advance. The company also ensures funding efficiency through diversification across capital markets and a broad network of high-quality banking partners (EDP, 2025a).

4.3.7 Summary of Financial Analysis

The financing mechanism of the Margonin Wind Farm serves as a value establishment prioritising environmental and social standards as well as an exemplifier of reliable and sustainable public-private partnerships. It is structured around targeted investments in physical infrastructure, human capacity, and natural resource stewardship, supporting a development pathway that is both low in carbon intensity and resilient to climate-related risks. The project emphasizes multi-stakeholder involvement represented by both the public and the private sector. In this way, long-term financial security, alignment with broader environmental objectives, and example setting for other renewable energy projects in Poland, are achieved.

5. Benefits created by the Margonin Wind Farm

There are three main categories of improvement as a result of the Margonin Wind Farm - economic, social, and environmental. What unites these three dimensions is welfare creation.

5.1 Economic Dimension

To begin with, the economic dimension of the value created by the Margonin Wind Farm project is directly connected to the efficiency of decisions made under a demanding set of conditions. This dimension is tied to the consumption and investment aspects of renewable energy development (European Investment Bank, 2023).

The Margonin Wind Farm generates income for local citizens in various ways. Firstly, the land acquisition for the project construction of the project was enabled via the signing of lease agreements with local owners. This resulted in a 10% marked increase in regional tax. Annual earnings of tenants and landowners rose by approximately PLN 8,000 per person (Dębicka, A. et al., 2024). Moreover, the region experienced infrastructure development due to the construction of the project. Infrastructure improvements included the construction and renovation of 10 km of local roads. Additionally, as one of the largest wind farms in Poland, the site has become a tourist attraction, contributing to local economic development and generating new income streams. The project also enhanced the reliability of the local electricity supply, thereby improving the commune's attractiveness for business investment (Dębicka, A. et al., 2024).

Furthermore, from a macroeconomic perspective, the reduction of GHG emissions via such RES initiatives results in a boost of GDP. The renewable energy project stimulates renewable energy job creation and increased financial security for the affected families (International Renewable Energy Agency, 2017).

The energy field and complex projects like the Margonin Wind Farm are supported by various occupations and skills. For instance, job opportunities could be related to operations and maintenance, construction and installation, or manufacturing (International Renewable Energy Agency, 2017). Addressing any existing skill gaps in a timely manner decreases the probability of project delays, failures, cost overruns and reduced acceptance of renewable energy installations. New job creation in Poland supported by renewable energy project development such as that of the Margonin Wind Farm aims to offset the job losses occurring with the gradual decrease to elimination of fossil fuel consumption. Such loss is caused not only by the green energy transition but also by rising automation, industry consolidation, and overcapacity (International Renewable Energy Agency, 2017).

Moreover, according to Poland's Ministry of Economic Development and Technology, a SWOT analysis could be made in terms of the Polish renewable energy industry:

Strengths	**Weaknesses**
❖ Localisation of leading manufacturers and distributors in Poland ❖ Availability of highly skilled engineering workforce ❖ Expanding wind energy export capacity	❖ Limited financial standing and undercapitalisation of enterprises ❖ Inadequate cooperation between companies and R&D centers at the national and international level ❖ The need to incur substantial expenditures on the transition from low-emission to net-zero economy ❖ Deficiency of investment capital in Polish renewable energy companies
Opportunities	**Threats**
❖ Large and stable national market with growth potential ❖ High standards of technical education at Polish universities ❖ Market positioning as a stable new technology incubator ❖ Increasing the share of recycling as a result of circular economy directives ❖ Advancements of renewable energy sources, energy storage facilities and smart power grid	❖ Escalating electricity costs ❖ Concentration of knowledge and equity among a few dominant companies ❖ Lack of interdisciplinary integration within the Polish scientific research landscape

Table 1: SWOT Analysis (Wind Industry Hub, 2024, p.17)

According to statistics, the energy field tends to be male-dominated with 80% representation of men compared to just 20% of women. It is almost four times more than the female one. Moreover, it is estimated that women earn about 15% less on average in comparison to their male colleagues (International Energy Agency, 2024). International studies show that factors that lead to these statistics are attitudinal and structural (Renewable Energy Agency, 2017). Examples of these are "a lack of background in the STEM (science, technology, engineering and mathematics) fields, dated perceptions of gender roles, discrimination in pay and the glass ceiling for managerial positions" (International Renewable Energy Agency, 2017, p.4). However, stable salary income enhances purchase making and stable demand creation for goods and services - therefore, it is critical to address these gender disparities (Renewable Energy Agency, 2017).

EDPR aims to be a leader in terms of gender equality practices promotion and tackles any factors of negative influence during its project creation. Since 2019, EDPR has been acknowledged by the Top Employers Institute as one of Europe's leading employers (EDP Renewables, 2023). Additionally, it has been included in the Bloomberg Gender-Equality Index (GEI) since 2020 - an internationally recognized benchmark that highlights organizations demonstrating a strong commitment to the advancement of gender equality (EDP Renewables, 2023). For the company, gender equality constitutes a cornerstone of civilizational progress and a natural extension of the principles of equal rights, freedoms, and opportunities for all individuals. The organization believes that the inclusion of diverse talents fosters a more motivating and collaborative work environment, and contributes to increased performance (EDP Renewables, 2023).

In alignment with its revised Code of Ethics and Diversity Commitment, EDPR is firmly dedicated to promoting mutual respect and ensuring equal opportunities irrespective of individual differences. The company is committed to maintaining an inclusive workplace, free from prejudice and discrimination, particularly with regard to gender, and does not permit any decision-making processes to be influenced by discriminatory factors (EDP Renewables, 2023).

In addition, EDPR, in alignment with the wider EDP Group, prioritizes the cultivation of a diverse and inclusive culture as an integral aspect of its organizational identity and human resources strategy. This commitment is grounded in the respect for human dignity and the promotion of equal opportunities, guiding both the company's internal operations and its external relations (EDP Renewables, 2023). Empirical literature confirms that gender-balanced teams contribute to superior innovation outcomes and operational performance, reinforcing the socio-economic value of inclusive policies (EDP Renewables, 2023). Therefore, the Margonin Wind Farm project stimulates job creation, earnings growth, enhanced well-being, gender equity, and the advancement of local industries (International Renewable Energy Agency, 2017, p.12).

Moreover, wind power generation is characterized by lower operating expenses in the long term. These expenses result in more affordable electricity prices and a reduced burden for Polish consumers. The understanding of these lower operating costs comes with a higher probability of making bigger upfront investments (International Energy Agency, 2024). Therefore, the speeding of the green and digital transition via projects like the Margonin Wind Farm, represents an aid mechanism for poorer households and reduces social inequalities. In this way, acceptance of renewable energy technologies is enhanced while simultaneously global climate goals are pursued (International Energy Agency, 2024).

Furthermore, the Margonin Wind Farm project contributes to the stability and predictability of energy prices. Electricity markets have experienced significant price surges and heightened volatility, primarily driven by elevated natural gas prices. Additionally, supply uncertainties related to other key energy commodities such as hard coal and crude oil, have exerted further upward pressure on electricity prices. In contrast, renewable energy sources, owing to their low marginal operational costs, contribute to price stabilization across the European Union, while simultaneously reducing dependence on fossil fuels and mitigating energy poverty (European Union, 2024).

The merit-order effect describes how low-marginal-cost renewable energy sources, such as wind and solar, are dispatched before costlier fossil-fuel-based generation in electricity markets. This prioritization lowers wholesale electricity prices by displacing more expensive conventional units. Consequently, expanding renewable energy supply with projects such as the Margonin, enhances market stability, reduces price volatility, and diminishes dependence on fossil fuels, delivering both economic and systemic benefits to the power sector (Wang, et al., 2024).

In response to challenges such as heightened price volatility, the EU has implemented strategic policy instruments, notably *"Tackling Rising Energy Prices: A Toolbox for Action and Support"* and *"REPowerEU: Joint European Action for More Affordable, Secure and Sustainable Energy",* affecting the Member State Poland (European Union, 2024). These initiatives encompass a broad range of measures including direct income support, fiscal incentives, energy efficiency improvements, and investments in energy storage (Wang, et al., 2024). Collectively, these tools aim to enhance the EU's resilience to future energy price shocks and provide a regulatory framework for the deployment of targeted subsidies to alleviate the socio-economic impact of elevated energy costs via the promotion of regenerative sources (European Union, 2024).

In summary, the Margonin Wind Farm creates various economic benefits at all stages of its lifecycle. The project exemplifies a comprehensive model of regional and national development through renewable energy deployment. At the regional scale, the project has stimulated economic activity via increased municipal tax revenues, elevated land lease incomes for local stakeholders, the enhancement of physical infrastructure, and the emergence of renewable energy-related tourism (Dębicka, A. et al., 2024). At the macroeconomic level, the transition to renewable energy catalyses employment generation, income stabilization, and aggregate demand expansion (International Renewable Energy Agency, 2017). Furthermore, the associated decline in greenhouse gas emissions contributes positively to national GDP (International Renewable Energy Agency, 2017). Crucially, the project illustrates the imperative of managing labour market transitions in the context of structural shifts away from fossil fuel dependency. The renewable sector's demand for new skill sets necessitates targeted human capital investment to address competency gaps, thus minimizing project delays and enhancing industrial competitiveness (International Renewable Energy Agency, 2017). EDPR's proactive engagement in gender inclusivity, evidenced by its adherence to frameworks such as the Bloomberg Gender-Equality Index, reflects a strategic approach to organizational diversity (EDP Renewables, 2023). From an energy systems perspective, the Margonin project contributes to electricity market stabilization through the merit-order effect, wherein low marginal cost renewable sources displace more expensive generation units. This mechanism mitigates energy price volatility and enhances long-term energy security. The project represents a critical node in Poland's transition towards a resilient, low-carbon economy (International Energy Agency, 2024).

5.2 Social Dimension

The social dimension of value creation by the Margonin Wind Farm encompasses various aspects of preservation and human capital optimization. Firstly, substituting fossil fuel-based electricity generation with renewable energy sources yields measurable public health advantages by mitigating air and water pollutants linked to respiratory and cardiovascular illnesses, neurotoxicity, and carcinogenesis. Empirical evidence indicates that this transition leads to reductions in premature mortality, morbidity-related productivity losses, and aggregate healthcare expenditures (Institute for Advanced Sustainability Studies (IASS), 2017).

Sustainable practices are not only the result of the functioning of the project but could also be observed in its lifecycle. The construction process was managed by four general contractors (1. SAG Elbud Gdańsk S.A. 2. GES 3. IBERINCO 4. GAMESA), each responsible for specific components of the project and fully accountable for work execution and compliance with health and safety regulations under Polish law (European Investment Bank, 2009). Safety measures include staff training, medical examinations, accident reporting, and maintaining safety documentation. In the operational phase, turbine maintenance was performed by certified personnel trained for working at heights and with electromechanical systems. Strict safety protocols govern all maintenance activities, including weather-related access restrictions, turbine entry procedures, and emergency evacuation rules, ensuring a high standard of occupational safety throughout the project lifecycle (ENVIRON Poland Sp. z o. o. , 2009, p.17).

Within the Margonin commune, there are approximately 200 culturally and historically significant sites, comprising residential structures, cemeteries, manor estates, landscaped parks, and archaeological locations. They are subject to formal protection under heritage conservation regulations. All earthworks associated with the Margonin Wind Farm development were conducted under archaeological supervision, in accordance with Permit No. 55/C/2008 issued by the Voivodeship Office for Monument Protection in Poznań (ENVIRON Poland Sp. z o. o. , 2009). The oversight was carried out by Dolnośląskie Biuro Przedsiębiorczości Krzysztof Starzyński. According to the 2008-2009 supervision reports, only minor archaeological materials were encountered, including fragments of modern-period ceramics within the Margonin Zachód area, with no evidence of substantive historical settlement remains. The findings were documented and reported to the regional heritage authority, ensuring compliance with applicable cultural resource protection requirements (ENVIRON Poland Sp. z o. o. , 2009).

Among the main challenges in power plant construction is controlling noise emissions within acceptable limits (Gawrońska, et al., 2019). For this reason, the noise impact of the Margonin Wschód and Margonin Zachód wind farms was assessed using a certified modeling tool, considering maximum turbine emissions (Dębicka, A. et al., 2024). The analysis confirmed compliance with regulatory permissible ambient noise levels (European Investment Bank, 2009) (55 dB during the day and 45 dB at night) at all residential receptor points (ENVIRON Poland Sp. z o. o. , 2009, p.15). To further mitigate potential noise impacts, 17 turbines closest to local communities were equipped with noise reduction systems (ENVIRON Poland Sp. z o. o. , 2009, p.15).

Environmental and Social Impact Assessments conclude that the Margonin Wind Farm does not substantially alter the visual character of the surrounding area, including the landscape protection zone near Lake Margonińskie and adjacent cultural heritage sites (ENVIRON Poland Sp. z o. o. , 2009, p. 15-16). On-site audits confirmed that turbines are visible across the region but are often partially obscured by natural features such as forests and buildings. They are noticeable from local and regional roads and the southern shore of Lake Margonińskie but generally blend harmoniously with the environment. Potential shadow flicker effects caused by turbine blades were acknowledged, though not extensively quantified. These effects depend on turbine proximity to residences and solar positioning (ENVIRON Poland Sp. z o. o. , 2009, p. 15-16). However, turbines are situated several hundred meters away from the nearest buildings. The distance mitigates shadow impact, while non-reflective paint reduces flicker. To minimize visual impact, turbines are painted in light colors to lessen visibility from afar, and no advertising is displayed on turbine support towers, aside from the company logo on the gondola. No significant visual concerns remain following these mitigation measures (ENVIRON Poland Sp. z o. o. , 2009, p. 15-16).

EDP Renewables initiated numerous stakeholder consultations to move the process of project development forward and in a sustainable manner. It is estimated that "70 residents of the town and municipality of Margonin" were involved in discussions in order to gain final approval for the project construction by the community (Gawrońska, et al., 2019). Specific stakeholder groups identified by EDPR include *population* (citizens of Margonin Community, citizens of Gołańcz Community, citizens of Wągrowiec Community), *neighbouring communities, NGOs, administrative stakeholders, employees of EDP Renovaveis in Poland, subcontractors,* and *lenders* (ENVIRON Poland Sp. z o.o. , 2013). To date, stakeholder engagement has involved disseminating project-related information to the local community, carried out both as part of preliminary project activities and in compliance with legal obligations for public consultation under the environmental impact assessment (EIA) process (ENVIRON Poland Sp. z o.o. , 2013).

The Margonin Wind Farm demonstrates compliance with comprehensive social protection standards. The contractor assumes full legal and operational responsibility for the prevention of harm when taking into consideration aspects such as material storage, waste management, and site practices. The project meets regulatory requirements concerning atmospheric and climate quality protection, mitigation of noise and vibration impacts, and the safeguarding of natural resources and biological diversity (Dębicka, A. et al., 2024).

5.3 Environmental Dimension

The environmental dimension is tied to the reduction of greenhouse gas emissions and other negative externalities on ecosystems which occur with non-regenerative energy generation. The Margonin Wind Farm project exemplifies how innovation could tackle the challenges of climate change externalities (European Investment Bank, 2009).

Wind energy systems exhibit minimal environmental impact, generating no direct emissions to air or soil during operation. Lifecycle carbon emissions, primarily arising from construction, installation, and maintenance, are relatively insignificant when compared to the emissions profiles of conventional fossil fuel-based power generation technologies (Hamed & Alshare, 2022, p.8). The productive functioning is estimated based on the total capacity, 120 MW, operating 40% of the time with end production of approximately 63,000 MWh. If the same amount of energy was to be produced by Poland's largest coal-fired power plant near Bełchatów, tons of harmful emissions would result - 67,410 tons carbon dioxide, 8 tons particle matter, 134 tons sulphur dioxide, 89 tons nitrogen oxides are avoided via the productive functioning of the Margonin Wind Farm (ENVIRON Poland Sp. z o. o. , 2009, p.6). Therefore, the direct environmental gain of the Margonin project is based on the emission avoidance (ENVIRON Poland Sp. z o. o. , 2009).

Furthermore, the Margonin Wschód and Margonin Zachód wind farms are situated within the administrative jurisdiction of the Margonin Commune in central Poland and land conservation measures were taken accordingly. The commune encompasses an area of approximately 122 km², characterized primarily by agricultural land, constituting approximately 60% of the total area) and forest areas (accounting for roughly 31%). No forest cutting took place for the goals of the project creation

(ENVIRON Poland Sp. z o. o. , 2009). The altitude is ranging between 84 and 92 metres above sea level (ENVIRON Poland Sp. z o. o. , 2009).

An important predisposition for the successful development of the project, was passing ecological check-ups to make sure that no living being would be impacted negatively by the construction and existence of the projects (European Investment Bank, 2009). The Margonin Wind Farm is situated about 6 km away from the border of the “Natura 2000” bird habitat area. This is vital, since the nearby territory hosts 11 habitat types identified under the EU Habitats Directive and supports 18 bird species listed in the Birds Directive, indicating its ecological significance and conservation value (ENVIRON Poland Sp. z o. o. , 2009). Since wind farms affect flying creatures, the project’s potential impact on the birds and bats in the region was tested (Dębicka, A. et al., 2024). Firstly, two series of ornithological studies were conducted in the area and surroundings in close proximity. A total of 21 bird species were recorded at the Margonin Zachód wind farm, whereas 66 species were documented at the Margonin Wschód wind farm. Mostly, they were species typical for Poland with “the common bittern (*lxobrychus minute*s), the white stork (*ciconia ciconia*) and the marsh harrier (*cirrus aeruginosus*)” (Dębicka, A. et al., 2024) being defined to be of extra value (Dębicka, A. et al., 2024). When it was concluded that the initially planned location of the wind farm could negatively impact the habitats of Lake Oporzyńskie and Lake Margonińskie, it was modified. With this modification, any potentially harmful impact to the bird population was limited significantly (Dębicka, A. et al., 2024). Comparable findings were obtained for bat populations, with over 160 bat species observed. As all recorded species were classified as low risk regarding population trends, no major conservation actions were deemed necessary (Dębicka, A. et al., 2024). Additionally, no local communities or enterprises were displaced due to the construction of the project (Dębicka, A. et al., 2024).

The wind farm operations do not involve water consumption or generate processed wastewater. Rainwater runoff from service areas and access roads naturally infiltrates the soil without entering a drainage system. No waste storage is planned within the

Margonin project site, ensuring compliance with environmental management and waste minimization.

The Margonin Wind Farm is located outside regions containing ecologically valuable or sensitive flora. Turbine installations are confined to agricultural land, where the impact on vegetation is considered negligible. Likewise, the routing of electrical cables predominantly follows existing roadways, thereby minimizing disturbance to higher-value plant habitats commonly associated with watercourses and aquatic ecosystems (ENVIRON Poland Sp. z o. o., 2009, p.18). Overall, it can be concluded that Margonin applies best practices in ecological mitigation and infrastructure design to reduce environmental and social impacts to a minimum (ENVIRON Poland Sp. z o. o., 2009).

The project-related investments of an electrical substation and overhead 110 kV powerline were also assessed for environmental consciousness. Firstly, the electrical substation serves a critical role in the energy transmission process by collecting the electricity generated by the wind turbines, performing the necessary voltage transformation, and subsequently delivering the power to the national grid through a 110 kV overhead transmission line. The facility is located south of the southern shoreline of Lake Margonińskie, within the administrative boundaries of the village of Sypniewo (ENVIRON Poland Sp. z o. o. , 2009). On-site assessments indicate that the substation is a modern and well-maintained infrastructure asset, fully equipped with comprehensive environmental protection systems in accordance with applicable regulatory and technical standards. Secondly, when it comes to the 110 kV overhead transmission line, the proposed high-voltage line is expected to have minimal impact on bird populations, as it replaces an existing line and follows the same route, allowing for continued avian adaptation (ENVIRON Poland Sp. z o. o. , 2009). Mitigation measures, including visual markers on cables and downward-facing insulators are integrated to prevent bird collisions and electrocution. Environmental disturbance is minimized by routing the line through previously developed areas, particularly within the Noteć Valley peatlands (ENVIRON Poland Sp. z o. o. , 2009). Social impacts are also limited, as landowner consultations were conducted during the planning stage N Poland Sp. z o. o. , 2009).

The environmental conservation measures taken when creating the Margonin Wind Farm Project as well as the environmental benefits created as a result of the functioning of the project are tied to the European Convention on Human Rights (ECHR) (Council of Europe, 2024). Article 2 of ECHR protects the “Right to life” (Council of Europe, 2024) - the project at hand was developed according to environmental and social standards and does not create conditions (e.g. pollution, accidents, etc.) for environmental degradation posing threats to human life (Council of Europe, 2024). To add, the project respects Article 3 “Prohibition to inhuman or degrading treatment or punishment” (Council of Europe, 2024), since no employees were exposed to toxic fumes or any other unfavourable working conditions (Dębicka, et al., 2024). Via active local community involvement and the signing of lease agreements with local owners to enable land acquisition for the project construction Margonin respects Article 6, “The right to fair trial” (Council of Europe, 2024), in cases when individuals might seek legal remedies in environmental matters (Council of Europe, 2024). The active participation of local Polish citizens enabled the fulfillment of Article 8, “The right to respect for private and family life” (Council of Europe, 2024), since the project doesn't produce noise disturbances or unfavourable landscape views (Dhar, et al., 2020).

Moreover, EDP Renewables, the European Investment Bank, and the European Bank for Reconstruction and Development emphasize transparency and have published detailed reports in regards to the project and their active involvement in it. This respects Article 10 “Freedom of expression” (Council of Europe, 2024), since it allows people to access and disseminate environmental information in favour of public debate or public interest (Dhar, et al., 2020).

It could be deduced that various factors were studied in the process of approving the development of the Margonin Wind Farm project when it comes to its environmental preservation value. Such factors include birds' collision with wind turbines, flashlights due to the Sun being reflected in the rotating blades, as well as tower design and the corresponding noise, visual, and climate impact (Hamed & Alshare, 2022). The land use, including land preparation, construction, access roads, and transmission lines, was carefully assessed to minimize potential impacts on local habitats and surrounding communities (Hamed & Alshare, 2022). Furthermore, non-thermal renewable technologies, such as wind energy, not only generate clean and abundant power but also have minimal water requirements, making them significantly more water-efficient than both fossil fuel-based and other renewable energy sources. Therefore, the Marginin Wind Farm project meets a high-level standard of environmental consciousness (Hamed & Alshare, 2022).

5.4 Stakeholder Analysis

When it comes to wind energy projects, there is the risk of social resistance. Theoretically, there could be identified four types of resistance:

1.	Support for wind power in general, but opposition to installations near one's own residence
2.	Initial support for wind energy that turns to opposition when local development is proposed
3.	Criticism focused more on the planning and decision-making process than on wind power itself
4.	Overall disapproval of wind energy, regardless of location

Table 2: Four Types of Resistance to Wind Energy Projects

(Enevoldsen & Sovacool, 2016)

Other specific reasons for oppositions could be observed below:

Environmental impact	Flora and fauna destruction Reduction of wildlife Felling of trees
Visual impact	Size, color and shape of the wind turbine Number of wind turbines Noise and flicker effects Usage of landscape
Socio-economic impact	Abuse of property and land values Lack of local benefits Lack of information from developer Political and market disapproval Number of wind projects in the area

Table 3: Public Resistance based on three Categories of Impact

(Enevoldsen & Sovacool, 2016)

According to the conducted interviews, Polish citizens have faith in renewable energy and favour it over fossil fuels. However, they also acknowledge the negative impact it has on the coal miners and their families. They agree that Poland needs to be more proactive in terms of its green policies.

An energy sector specialist highlighted specifically that Poland's strong economic growth trajectory, combined with its strategic geographic position at the heart of the integrated European electricity market, positions the country to become a major driver of renewable energy deployment across Europe. The expert further noted that as technological efficiency improves and average electricity prices in Europe remain high, the need for financial subsidies to support wind farm operators will decrease significantly. Consequently, market-based returns on investment are expected to align more closely with the broader societal value of renewable energy, thereby enabling optimal deployment through price-based investment mechanisms.

Additionally, a representative from the European Investment Bank (EIB) confirmed that funding for the Margonin Wind Farm was approved on the basis of its alignment with social impact and sustainability criteria. This underscores the importance of targeted green investments that meet comprehensive evaluation standards.

In conclusion, the insights gathered from diverse stakeholders, including citizens, energy experts, and institutional financiers, reflect a growing consensus in favor of Poland’s green energy transition. Projects like the Margonin Wind Farm exemplify how renewable energy initiatives can simultaneously advance environmental goals and satisfy socio-economic and investment criteria.

5.5 Summary of Evaluations

The Margonin Wind Farm serves as a comprehensive model of sustainable energy infrastructure, integrating environmental integrity, socio-economic development, and public health considerations. By transitioning to clean, non-thermal wind energy, the project contributes to a measurable reduction in air pollutants associated with fossil fuel combustion, thereby lowering population exposure to harmful emissions. This results in improved public health outcomes. Additionally, the project stimulates local economies through job creation and increased public investment capacity, particularly in the sectors of health and education (ENVIRON Poland Sp. z o. o. , 2009).

Socially, the project advances principles of energy justice by ensuring equitable access to renewable energy while actively involving both internal and external stakeholders in planning and decision-making processes. This participatory approach fosters local ownership, enhances social inclusion, and strengthens regional identity. In conclusion, the Margonin Wind Farm illustrates how renewable energy initiatives can support sustainable development through an integrated, scientifically grounded framework (Dębicka, A. et al., 2024).

From an environmental standpoint, the wind farm complies with all relevant regulatory and legal frameworks. Its design and siting avoid ecologically sensitive habitats and culturally significant areas, while minimizing impacts related to noise, vibration, and visual intrusion. Protective measures ensure the preservation of air, soil, and water quality, and no adverse effects on biodiversity or heritage assets have been identified (International Renewable Energy Agency, 2017). Therefore, it can be deduced that the Margonin Wind Farm has a positive impact on the socioeconomic development of Poland (Dębicka, A. et al., 2024).

6. Discussion and Policy Recommendations

6.1 Discussion

For domestic policies in Poland to be effective, they must be embedded within a wider industrial framework that supports the growth of reliable supply networks and essential infrastructure, connects education and workforce development initiatives, and stays aligned with evolving technologies and market conditions (International Renewable Energy Agency, 2017, p. 10).

The dimensions of policy packages applicable to the renewable energy field specifically could be illustrated with the graph below (Janoska, 2018):

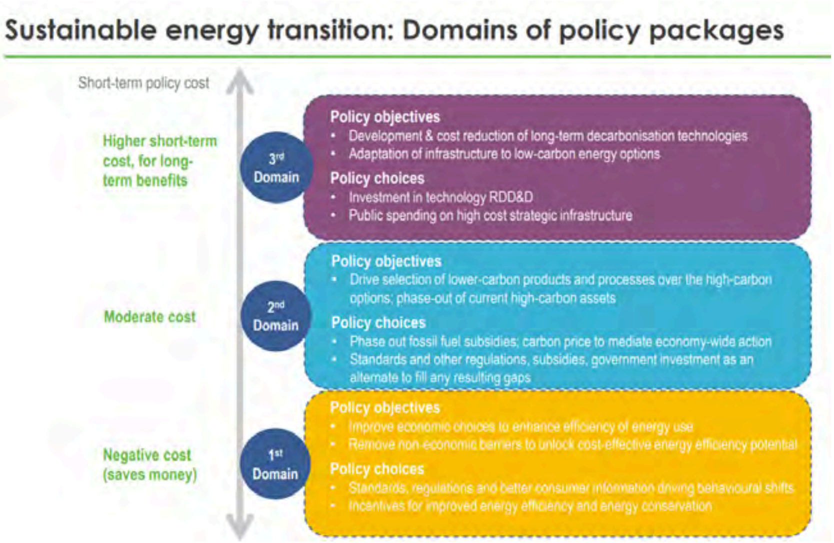

Fig. 10: Sustainable Energy Transition: Domains and Policy Packages (Janoska, 2018)

Nevertheless, there are **constraints** to policy packages in favour of renewable energy generation: "economic competitiveness and distributional impacts, historic economic structure and existing assets attractiveness to investment" (Janoska, 2018).

Additionally**, Challenges** of wind energy development include **“**(i) regulatory uncertainty, (ii) access to finance and (iii) high costs of innovative solutions versus current practice” (European Investment Bank, 2023).

These policy constraints and wind energy field challenges could be addressed with an improved policy framework. By setting best-practice projects like Margonin Wind Farm as examples, Poland can refine its regulatory environment to accelerate wind energy deployment while maintaining high standards for environmental protection, public health, and social equity. Such reforms are essential for realising Poland’s full renewable energy potential and advancing a just energy transition (Janoska, 2018).

6.2 Project-specific Recommendations

The project Margonin Wind Farm is compliant with IFC’s standards such as environmental and social appraisal, organisational capacity and commitment, training, community engagement, disclosure, human resources policy, habitats alteration, etc (ENVIRON Poland Sp. z o. o. , 2009).

Project-specific recommendations are limited to continuing the diligent monitoring mechanisms and respect for social and environmental standards as well as promoting circularity of action.

When it comes to circular practices, there is increased complexity of processes, which wind project developers need to tackle and implement successfully in projects such as Margonin. The end-of-life treatment of wind turbine blades is constrained by several material and process-related limitations (Magalhães, et al., 2023, p.577). Prolonged exposure to environmental stressors over a typical 20-year operational lifespan leads to degradation in material integrity, rendering blades unsuitable for direct reuse (Magalhães, et al., 2023, p.577). Their substantial dimensions further complicate dismantling, transport, and processing, posing logistical and economic burdens. Structurally, blades are composed of thermoset composite materials, which are inherently non-reprocessable. The heterogeneous composition, involving fibers, polymer matrices, and fillers, complicates separation and recycling efforts (Magalhães, et al., 2023, p.577). Mechanical recycling often compromises fiber integrity, thereby limiting the recovered material to low-grade applications. As landfill disposal is increasingly restricted under European waste management policies, incineration with energy recovery has become the prevalent disposal pathway for composite blade materials (Magalhães, et al., 2023, p.577).

6.3 Lessons for other Renewable Energy Projects in Poland

Recommendation 1: Enhance Skills Training and Job Creation in the Wind Energy Field in Poland

The transformation of energy systems necessitates comprehensive technical training for local engineers and technicians to support the deployment, maintenance, and repair of renewable energy infrastructure. In Poland, a substantial share of the labor force remains employed in carbon-intensive industries. Consequently, the implementation of targeted re-skilling and up-skilling initiatives is critical to mitigating income insecurity and addressing societal resistance to the transition toward renewable energy sources (International Renewable Energy Agency, 2024).

Recommendation 2: Secure more Funding for the Green Energy Transition

Effective implementation of renewable energy, electrification of end-use sectors, and energy efficiency measures depends on strategic planning and regulatory innovation (International Renewable Energy Agency, 2024). These transitions often involve high initial capital expenditures, particularly for the installation of renewable energy infrastructure and electrified systems. For this reason it is important to secure more funding for the green energy transition specifically (European Commission, 2024b). A comprehensive assessment of various factors, including installation expenditures, spatial configuration of the wind farm, and ongoing maintenance costs, is essential to balance the projected revenues and determine the overall cost-effectiveness of the project (Magalhães, et al., 2023). Strengthened international collaboration can play a crucial role in lowering financial barriers by facilitating access to financial resources (International Renewable Energy Agency, 2024).

Recommendation 3: Stimulate Energy Research and Innovation

Energy research and innovation play a pivotal role in driving technological advancement and enhancing circularity within the sector. Notably, the five key strategies "reuse, resizing/reshaping, recycling, recovery, and conversion", have been identified as fundamental to circular economy implementation. These strategies can be significantly improved and scaled through continued innovation and the development of advanced technologies (Magalhães, et al., 2023, p.579).

Recommendation 4: Advancing Circularity of Action in the Renewable Energy Sector

It is vital to stimulate sustainable decommissioning procedures (Dhar, et al., 2020). The wind energy sector is increasingly focused on enhancing sustainability through circular economy principles, particularly in managing turbine blade end-of-life. The expected lifetime of a wind turbine is about 20 years and a solution is needed for after they pass (European Investment Bank, 2009). Although there is a growing support for recycling or repurposing blades, significant challenges remain (Magalhães, et al., 2023, p.576). These include the limited recyclability of existing equipment, especially blades made from complex composite materials and the difficulty of scaling up circular solutions. The development of eco-friendly materials that meet performance standards is still in progress (Magalhães, et al., 2023, p.576).

In addition to technical challenges, several barriers hinder progress: inadequate financial incentives, high costs of recycled materials, limited second-hand markets, and fragmented legislation (Magalhães, et al., 2023, p.15). Technical complexities and rebound effects also complicate efforts to improve circularity. Addressing these issues will require coordinated efforts in innovation, policy, and investment to enable a more sustainable and circular wind energy industry (Magalhães, et al., 2023, p.15).

Recommendation 5: Tackle the Current Energy Policy Risk

Europe is still heavily reliant on fossil fuel imports in order to meet its needs of high energy intensity - its reliance is estimated to be up to 50%. According to statistics published by the European Commission, this value will keep rising and might even reach 65% until 2030 if the region does not take rapid measures to accelerate its green energy transition and reduce dependencies (Morthorst & Awerbuch, 2009). This statistic is illustrated via the graph below:

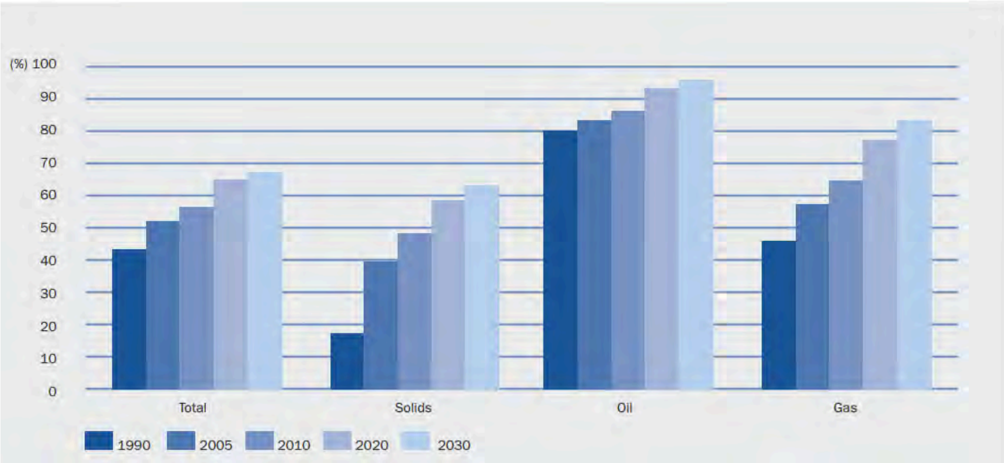

Fig. 11: EU-27 Development of Import Dependency up to 2030
(Morthorst & Awerbuch, 2009)

After all, innovation triggers economic growth and increased energy capacity needs. As Europe keeps its trajectory of development, it requires more and more energy to satisfy the new demand. Furthermore, the geographic areas from which the EU tends to import its energy sources tend to be politically unstable. This concentration of suppliers is unfavourable due to the increased risk and lack of predictability. For these reasons, it is critical that the current energy policy risk is reduced significantly (Morthorst & Awerbuch, 2009).

Recommendation 6: Stimulate Supply Diversification

Enhancing supply source diversification and promoting distributed electricity generation are essential to improving energy security and resilience. Leveraging locally available renewable resources such as wind, solar, and biomass can support decentralization efforts while reducing dependence on imported fossil fuels. This approach aligns with broader EU climate goals and fosters regional energy self-sufficiency (Dębicka, A. et al., 2024).

Recommendation 7: Protecting Polish Forest Areas from Exploitation for RES Purposes

Protection of forests against overexploitation for biomass production is key to sustainable development. Sustainable exploitation of agricultural areas for the production of energy from renewable sources, including biofuels, is necessary, in order to avoid any competition between the production of renewable energy and agriculture, as well as to preserve environmental diversity (Dębicka, A. et al., 2024).

Recommendation 8: Implement Technologies which allow for Construction of Larger Wind Turbines

Modern wind turbines, with rated capacities ranging from 0.5 to 2 megawatts and rotor diameters between 40 and 90 meters, possess large swept areas that enhance aerodynamic efficiency. This increased efficiency contributes to higher power output and reduced levelized cost of electricity (LCOE) from wind energy systems (Hamed & Alshare, 2022, p.3). The usage of such turbines in Poland would optimize the energy production potential and the use of domestic sources, which in turn contributes to energy security (Hamed & Alshare, 2022, p.3).

Recommendation 9: Stimulate Cross-border Interconnectivity

The Member State Poland should enhance cross-border interconnectivity as a means of improving resilience to short-term price volatility in the energy market (European Union, 2024).

Recommendation 10: Investing in Modernization of the Union's Electricity Infrastructure

Furthermore, strengthening the internal energy market necessitates a significant modernization of the Union's electricity infrastructure. This is essential to accommodate a substantial increase in renewable energy generation capacity, characterized by weather-dependent variability and evolving electricity flow patterns across the EU (European Union, 2024).

Recommendation 11: Protecting the Rights of Polish Consumers

Safeguarding consumer rights is paramount. Consumers should be empowered to make informed choices from a diverse array of contractual arrangements, with particular attention given to protecting the interests of vulnerable populations (European Union, 2024).

Recommendation 12: Speeding up Permission Processes

Streamlining the approval process is critical to unlocking the full potential of wind energy in Poland. Slowness and increased administrative burden translates into significantly lower growth rate in terms of investments in the wind power capacity of the country (Wind Industry Hub, 2024).

Recommendation 13: Use Wind Turbines manufactured in Europe for the Construction Process

Prioritising the usage of wind turbines manufactured in Europe increases competitiveness of the European market. Examples of materials used in the manufacturing process include "concrete, steel, composite materials (fiberglass, carbon fibre, polymers and other), copper, and aluminium" (Wind Industry Hub, 2024, p.19). This helps to deal with the major competitor, China, which is advancing on the global manufacturing scene via pricing and more favourable trading conditions overall (Wind Industry Hub, 2024).

Recommendation 14: Address Energy Security Challenges

The large-scale deployment of renewable energy technologies introduces significant system security challenges arising from their volatile and intermittent generation profiles. Ensuring the reliability and stability of the power system under these conditions necessitates the integration of sufficient firm capacity and advanced energy storage solutions to buffer against temporal mismatches between generation and demand (European Union, 2024).

Cross-border Power Purchase Agreements (PPAs) serve as pivotal instruments in facilitating transnational renewable energy integration and market coupling. However, their design must be underpinned by robust contractual and regulatory safeguards to ensure operational continuity and risk mitigation under extreme or unforeseen conditions (European Union, 2024).

In parallel, capacity remuneration mechanisms (CRMs) remain indispensable during the decarbonization trajectory, particularly in jurisdictions characterized by inadequate grid interconnectivity or high system inertia. Nonetheless, these mechanisms require further refinement to enhance their responsiveness and robustness under systemic stress scenarios (European Union, 2024).

Critically, the resilience and strategic autonomy of the Union's energy system are contingent upon the establishment of a strong domestic manufacturing base for clean energy technologies, including solar photovoltaics, wind turbines, electrolyzers, and battery systems. This imperative transcends economic competitiveness, constituting a fundamental pillar of energy security. Excessive dependence on extrinsic value chains for critical energy components introduces systemic vulnerabilities, heightening exposure to geopolitical disruptions and supply chain fragility (European Union, 2024).

7. Conclusion

This Master's thesis has examined the multifaceted impact of the Margonin Wind Farm Energy Project on the socioeconomic development of Poland. Through detailed analysis, it has become evident that this project transcends its primary function as a renewable energy facility, representing a strategic initiative that embodies national aspirations toward sustainable growth, energy autonomy, and environmental preservation. The research findings demonstrate that the Margonin Wind Farm plays a vital role not only in enhancing Poland's renewable energy capacity but also in fostering economic, social, and environmental progress aligned with both national policy objectives and the broader goals of the European Union (Dębicka, A. et al., 2024).

The development and operationalization of the Margonin Wind Farm reflect a comprehensive and multi-layered process involving a wide array of stakeholders, including national authorities, financial institutions, private investors, and local communities. The success of this project underscores the importance of coordinated governance and strategic planning in the implementation of large-scale renewable energy infrastructure. Poland's ability to harness wind energy on such a scale illustrates the country's ongoing commitment to diversifying its energy mix and reducing dependency on imported fossil fuels, thereby enhancing its energy security in a volatile geopolitical landscape (Environmental Defenders Office, 2025)..

The integration of the Energy Transition Theory and the Stakeholder Theory frameworks reveals that successful energy transitions are not solely technical or economic processes but are also deeply influenced by social, behavioral, and institutional factors. Cognitive awareness, motivational values, and contextual conditions are pivotal in shaping energy-related behaviors and the public perception of renewable energy technologies. The Margonin Wind Farm demonstrates that when renewable energy projects are designed with these dimensions in mind, they are more likely to achieve societal acceptance and long-term sustainability (Harichandan, et al., 2022).

The connection between these theories also underscores the necessity of inclusive decarbonization. The involvement of diverse stakeholders, ranging from policymakers and engineers to local citizens, ensures that the energy transition is not only efficient but also equitable. Furthermore, this inclusive approach contributes to the democratization of energy systems (Sustainability Directory, 2025).

From an economic standpoint, the Margonin Wind Farm contributes substantially to regional development. It has generated employment opportunities, both during the construction phase and in ongoing operations and maintenance, thereby stimulating local economies. It has also contributed to increased public revenues, enabling further investment in critical public services such as health and education. The financing model employed, featuring collaboration between the European Investment Bank, the European Bank for Reconstruction and Development, commercial banks, and private sector actors, exemplifies the potential of blended finance mechanisms to support sustainable development initiatives (European Bank for Reconstruction and Development, 2014).

Social impacts of the Margonin Wind Farm are equally noteworthy. The project aligns with principles of energy justice by ensuring equitable access to energy resources and promoting inclusive stakeholder engagement. The participatory planning process adopted by EDP Renewables facilitated local involvement and fostered a sense of ownership among community members. This inclusive approach not only bolstered public acceptance but also contributed to social cohesion and strengthened regional identity (European Investment Bank, 2009).

From an environmental perspective, the Margonin Wind Farm has proven to be a model of ecological responsibility. The project complies with all relevant environmental regulations and standards, ensuring the protection of local ecosystems, air and water quality, and biodiversity. By replacing conventional, carbon-intensive energy sources with wind-generated electricity, the project significantly reduces greenhouse gas emissions, contributing to the European Union's broader climate neutrality objectives for 2050 (ENVIRON Poland Sp. z o. o. , 2009).

The outcomes of this study suggest several opportunities for future research. Firstly, it is important to investigate the relationship between community engagement strategies and the long-term operational success of renewable energy projects. Comparative studies involving similar wind farms across different regions in Poland or other EU Member States could yield valuable insights into best practices and contextual challenges. Moreover, further research into the role of renewable energy in shaping national geopolitical strategies, especially in light of recent global energy crises, would contribute to a deeper understanding of energy security and autonomy (Environmental Defenders Office, 2025).

Another important area for future exploration is the design and effectiveness of domestic content policies within the renewable energy sector. While such policies hold promise for fostering local industry and job creation, their success depends on the integration with broader industrial strategies, workforce development programs, and technological innovation systems. Evaluating how these elements interact in the Polish context would provide critical policy insights (Environmental Defenders Office, 2025).

Finally, further study into the behavioral and cultural dimensions of the green energy transition would be beneficial. Understanding how individuals and communities perceive the symbolic and practical value of renewable technologies could inform the design of public awareness campaigns and incentive structures (Environmental Defenders Office, 2025). As this thesis has demonstrated, behavioral change is integral to the success of any energy transition, and targeted interventions, whether informational, economic, or regulatory, will be crucial in encouraging widespread adoption of sustainable practices. Targeted informational, financial, or regulatory interventions must be tailored to address both motivational drivers and contextual barriers to foster the widespread adoption of sustainable practices (Magalhães, et al., 2023).

In conclusion, the Margonin Wind Farm Energy Project serves as a compelling case study of how renewable energy infrastructure can drive multifaceted national development. It exemplifies the synergy between technological innovation, policy coherence, social engagement, and environmental stewardship. Through its economic contributions, social inclusivity, and ecological benefits, the project stands as a benchmark for future sustainable energy initiatives in Poland and beyond. The findings of this thesis reinforce the idea that renewable energy projects are not isolated interventions but critical components of an integrated approach to development. By aligning energy policy with sustainable development goals, engaging diverse stakeholders, and fostering public trust, Poland is well-positioned to lead in the European green transition. However, achieving long-term success will require continued research, adaptive governance, and sustained commitment to inclusive and science-based policymaking. The Margonin Wind Farm thus not only contributes to Poland's current energy needs but also offers a strategic pathway toward a more resilient, equitable, and sustainable future (International Renewable Energy Agency, 2017).

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9. Annex

Interviews with private Polish citizens, independent energy specialists, EIB (funding provider) are included for objectivity and information purposes.

List of private Polish citizens:

- Patryk Frąckowiak
- Darya Nedabeha
- Salminaz Khudiyeva
- Julia Gorzelańczyk

Independent energy expert:

- André Wolf (Policy Analyst at the Centre for European Policy (cep))

Investor relations:

- Heike Freimuth (Head of the EIB Group Office in Germany)

Dear Friend,

I am writing to you due to your connection to Poland. As you know, I am currently doing my Master's degree in *EU Trade and Climate Diplomacy* and a milestone of key relevance is my Master's thesis dedicated to the **"Impact of the Margonin Wind Farm Energy Project on the Socioeconomic Development of Poland"**.

The Master's thesis will inspect how an energy project affects the socio-economic development of Poland. Poland is chosen because it is representing significant progress from energy, water management and infrastructure perspective. Nevertheless, the country is still subject to development in each of these aspects and its ambitious efforts are driven by the goal of social well-being and environmental conservation which respects the Sustainable Development Goals. The thesis will focus on one energy project and analyze its conception, management and effects in detail. Since the wind energy sector is well developed in Poland and therefore represents a big portion of the electricity production of the country, this type of energy generation will be inspected. The chosen project is the **Margonin Wind Farm -** a project by EDP Renewables.

My research question is "**How does the Margonin Wind Farm Energy Project impact the Socioeconomic Development of Poland?". Sub-questions are: 1. Which processes are involved in the development and creation of the Margonin Wind Farm? 2. In which ways does the Margonin Wind Farm influence the socioeconomic development of the country? 3. Is this energy project an example of innovation and how relevant it is in terms of Poland's green energy transition?.** With my research I hope to prove that the Margonin Wind Farm is an example of innovation and sustainable development - from the project's planning to its implementation stage. It functions in a socially and environmentally conscious way.

In order for a project to be analyzed objectively, there needs to be both scientific data and personal perspective of private individuals.

I would really appreciate it if you could take time and reply to the following questions to the best of your knowledge. Your opinion is valid and will be taken into consideration in terms of the stakeholder analysis.

Questions

1. **Could you, please, tell me your name and current occupation?**

My name is Patryk Frąckowiak, I'm a student at Poznań University of Technology.

2. **Could you, please, share with me your connection to Poland? For how long have you been living there?**

I am Polish. I've been living here since I was born.

3. **What is your view on renewable energy? Do you think that the renewable energy sector in Poland has been developing successfully? Does more need to be done?**

In my opinion implementing renewable energy is much better for our environment and society than using carbon. Poland has seen positive growth in the renewable energy sector but still coal continues to be the primary source of electricity. We have many challenges related to coal dependency, political situation, technological advancements etc.

4. **Would you say that the Polish government is supportive of the green energy transition? What efforts are put into that direction?**

Poland is developing renewable energy but as I mentioned before country is dependent on coal and the economic importance of the coal industry. Poland remains one of the largest coal users in Europe.

What efforts are put into that direction?

It depends on economic issues related to this sector.

Polish government introduced various programs supporting the development of renewable energy sources. For example: program **"Czyste Powietrze" [Clean Air]** replacing coal furnaces with more ecological heat sources, including those from renewable energy sources

5. **Do you agree that sustainability principles have been integrated into the project?**

Renewable energy projects in Poland are still in the phase of intensive development, and their implementation is closely related to the principles of sustainable development. The introduction of such projects into the national energy system aims to meet the growing demand for energy in an environmentally friendly manner, reduce greenhouse gas emissions and improve air quality.

6. **Do you agree that the project benefits local communities? How about Polish citizens in general? Please, rate the degree of welfare in terms of the Margonin Wind Farm project specifically.**

The Margonin Wind Farm Project creates …	**Category**	1	2	3	4	5
***1** Disagree* ***2** Partially disagree* ***3** Neutral* ***4** Partially agree* ***5** Fully agree*	aesthetics			X		
	positive impact on lifestyle			X		
	new job opportunities (new income sources)					X
	addition to employment diversity					X
	poverty alleviation			X		
	Improved health & safety: public		X			
	improved health & safety: work				X	
	security and diversification of energy supply				X	
	increased energy self-reliance				X	
	improvement of local population’s skills and education			X		
	technological advances and transfer					X
	noise		X			

	impacts on the landscape		X			
	potential displacement and cultural heritage impacts			X		

7. Do you agree that the EU's normative values have impacted the project?

I agree, Poland is part of the European Union so it has to meet certain environmental standards. The regulations likely helped to deploy and improve the project. Financial support and clear goals from the European Union play an important role.

Dear Friend, thank you so much for your valuable contribution! I will keep you updated on the progress of my Master's thesis.

Kind regards,

Maria Tsanova

Questions

1. **Could you, please, tell me your name and current occupation?**

My name is Darya Nedabeha, I'm a student at the University of Gdansk.

2. **Could you, please, share with me your connection to Poland? For how long have you been living there?**

I live and study in Poland for almost 5 years. My grandfather was polish and I have a Polish Card.

3. **What is your view on renewable energy? Do you think that the renewable energy sector in Poland has been developing successfully? Does more need to be done?**

I think renewable energy is a great way to produce power without harming the environment. It's clean, sustainable, and helps reduce pollution and greenhouse gas emissions. Plus, with advancements in technology, renewable energy sources like solar and wind are becoming more efficient and affordable.

4. **Would you say that the Polish government is supportive of the green energy transition? What efforts are put into that direction?**

Poland has been making progress, especially with wind and solar energy. But since the country still relies a lot on coal, there's definitely more work to be done. Investments in infrastructure and simplifying regulations would help speed up the transition.

5. **Do you agree that sustainability principles have been integrated into the project?**

It varies by project. A lot of renewable energy initiatives in Poland focus on sustainability by reducing environmental harm and ensuring long-term benefits. However, there's still space for progress, particularly in managing land, waste, and involving local communities.

6. **Do you agree that the project benefits local communities? How about Polish citizens in general? Please, rate the degree of welfare in terms of the Margonin Wind Farm project specifically.**

The Margonin Wind Farm Project creates …	**Category**	1	2	3	4	5
1 *Disagree* ***2*** *Partially disagree* ***3*** *Neutral* ***4*** *Partially agree* ***5*** *Fully agree*	aesthetics			X		
	positive impact on lifestyle			X		
	new job opportunities (new income sources)					X
	addition to employment diversity					X
	poverty alleviation				X	
	Improved health & safety: public		X			
	improved health & safety: work			X		
	security and diversification of energy supply				X	
	increased energy self-reliance				X	
	improvement of local population’s skills and education			X		
	technological advances and transfer				X	
	noise			X		

	impacts on the landscape		X			
	potential displacement and cultural heritage impacts				X	

7. **Do you agree that the EU's normative values have impacted the project?**

Yes, the EU's policies and climate goals have played a big role in shaping the project. Since Poland is part of the EU, it has to meet certain renewable energy targets and environmental standards. These regulations likely helped drive the development of the Margonin Wind Farm by offering financial support and setting clear goals for reducing emissions. Without the EU's influence, the transition to green energy might have been slower.

Dear Friend, thank you so much for your valuable contribution! I will keep you updated on the progress of my Master's thesis.

Kind regards,

Maria Tsanova

Questions

1. **Could you, please, tell me your name and current occupation?**

Salminaz Khudiyeva

2. **Could you, please, share with me your connection to Poland? For how long have you been living there?**

Since 2021, I started my master degree in Warsaw. I am working now.

3. **What is your view on renewable energy? Do you think that the renewable energy sector in Poland has been developing successfully? Does more need to be done?**

I strongly support renewable energy and believe it is essential for a sustainable future. Transitioning away from fossil fuels not only helps combat climate change but also promotes energy independence and economic growth.

Regarding Poland, the renewable energy sector has made noticeable progress, especially with wind and solar power. However, coal still plays a dominant role in the energy mix, and the pace of change has been slower compared to other European countries. While government policies and EU funding have encouraged some growth, bureaucratic obstacles and regulatory inconsistencies have hindered faster development.

More definitely needs to be done. Poland has great potential for offshore wind and further solar expansion, but stronger incentives, infrastructure investments, and streamlined regulations are necessary. Public awareness and corporate involvement should also increase to accelerate the transition.

4. **Would you say that the Polish government is supportive of the green energy transition? What efforts are put into that direction?**

I'd say the Polish government is kind of in between when it comes to supporting the green energy transition. On one hand, there are some efforts—like investments in offshore wind, solar projects, and EU-funded initiatives—but on the other hand, coal is still a big thing here, and the transition is happening pretty slowly.

There are renewable energy auctions, some grid modernization plans, and talk about moving away from coal, but there are also a lot of bureaucratic hurdles and unpredictable policy changes that make things complicated. It feels like they're taking steps forward, but not as fast or as decisively as they could. If they really want to speed things up, they need to cut the red tape, create better incentives, and actually commit to a clear, long-term strategy.

5. **Do you agree that sustainability principles have been integrated into the project?**

It depends on the project, but if sustainability was a key focus from the start—considering environmental impact, resource efficiency, and long-term viability—then yes. If it's more of a surface-level effort without real structural changes, then not really.

6. **Do you agree that the project benefits local communities? How about Polish citizens in general? Please, rate the degree of welfare in terms of the Margonin Wind Farm project specifically.**

Yeah, the Margonin Wind Farm helps the local community with jobs and tax revenue, so it's a plus. For Polish citizens in general, it's good for clean energy, but the impact isn't huge.

The Margonin Wind Farm Project creates …	**Category**	1	2	3	4	5
1 Disagree *2 Partially disagree*	aesthetics		+			
	positive impact on lifestyle			+		
	new job opportunities (new income sources)			+		
	addition to employment diversity				+	

***3** Neutral* ***4** Partially agree* ***5** Fully agree*	poverty alleviation		+			
	Improved health & safety: public				+	
	improved health & safety: work				+	
	security and diversification of energy supply				+	
	increased energy self-reliance			+		
	improvement of local population's skills and education		+			
	technological advances and transfer		+			
	noise		+			
	impacts on the landscape			+		
	potential displacement and cultural heritage impacts			+		

7. **Do you agree that the EU's normative values have impacted the project?**

Yes:)

Dear Friend, thank you so much for your valuable contribution! I will keep you updated on the progress of my Master's thesis.

Kind regards,

Maria Tsanova

1. Could you, please, tell me your name and current occupation?

Julia Gorzelańczyk, soon to start a Master's degree in Spatial Sustainability Studies.

2. Could you, please, share with me your connection to Poland? For how long have you been living there?

I was born in Poland and spent most of my life there, until I moved abroad to study. I still visit Poland regularly.

3. What is your view on renewable energy? Do you think that the renewable energy sector in Poland has been developing successfully? Does more need to be done?

I believe that renewable energy is the future of our planet and that countries should invest in infrastructures that provide such energy.
Unfortunately, I don't think the Polish energy sector is developing successfully or quickly enough. There is still too much focus on the coal industry, which stops any significant developments in building nuclear power plants. Of course, the situation is quite complicated, as limiting coal production leads to loss of income for countless Polish miners.
So, between miners protesting and EU's pressure to increase the renewable energy production, not that much can be and is done.

4. Would you say that the Polish government is supportive of the green energy transition? What efforts are put into that direction?

Compared to other European countries, Poland has significantly less wind turbines. Furthermore, the previous Polish government voted in laws that slowed down the process of building wind power plants, as they could only be placed 500 metres away from any residential buildings.
The current government focuses too much on the short-sighted profit and renewable energy never seems to be their priority.

Questions 5, 6 & 7

This is the first I've heard of that particular project. And I don't think I've ever even been in Margonin.

Dear Dr. Wolf,

The Master's thesis will inspect how an energy project affects the socio-economic development of Poland. Poland is chosen because it is representing significant progress from energy, water management and infrastructure perspective. Nevertheless, the country is still subject to development in each of these aspects and its ambitious efforts are driven by the goal of social well-being and environmental conservation which respects the Sustainable Development Goals. The thesis will focus on one energy project and analyze its conception, management and effects in detail. Since the wind energy sector is well developed in Poland and therefore represents a big portion of the electricity production of the country, this type of energy generation will be inspected. The chosen project is the **Margonin Wind Farm -** a project by EDP Renewables. Since I completed an internship semester in the business development field at the company's Hungarian branch during my Bachelor's degree in "International Business", I am familiar with many of EDPR's operations and knowledgeable about their corporate social responsibility's practices.

My research question is "**How does the Margonin Wind Farm Energy Project impact the Socioeconomic Development of Poland?". Sub-questions are:**

1. **Which processes are involved in the development and creation of the Margonin Wind Farm?**

2. **In which ways does the Margonin Wind Farm influence the socioeconomic development of the country?**

3. **Is this energy project an example of innovation and how relevant is it in terms of Poland's green energy transition?**

With my research I hope to prove that the Margonin Wind Farm is an example of innovation and sustainable development - from the project's planning to its implementation stage - that it functions in a socially and environmentally conscious way.

In order for a project to be analyzed objectively, there needs to be both scientific data and personal perspective of private individuals.

Questions

1. **Could you, please, tell me your name and current occupation?**
   Name: André Wolf
   Occupation: Policy Analyst at the Centre for European Policy (cep)

2. **Could you briefly explain your view on the current status of the renewable energy field in Poland as well as its potential?**
   In my view, Poland is a special case in the European energy transition. On the one hand, the country is still heavily dependent on coal as a source of electricity, especially compared to its neighbors. On the other hand, it has managed to reduce this dependency in recent years, in particular by building new wind power capacity. In the near future, rising CO_2 prices are likely to encourage this trend, leading to a gradual phase-out of coal from the energy mix. Combined with the country's generally remarkable economic growth trajectory and its geographical position at the center of an integrated European electricity market, Poland can become a key driver of renewable energy deployment in Europe. The country's demand will also serve to strengthen European value chains for wind power equipment, contributing to Europe's resilience in access to clean technologies.

3. **What socioeconomic benefits of the project can you identify?**
   A major direct benefit is the replacement of fossil fuel-based power generation, in this case mainly coal. This will not only help to reduce greenhouse gas emissions, but will also reduce emissions of local pollutants (e.g. sulphur oxides, nitrogen oxides) from fossil-fueled power plants, thereby reducing health risks and improving the quality of life for citizens in the vicinity of these plants. The wind farm is also likely to bring additional indirect benefits to communities in the region. It strengthens incentives to invest in the quality of the general local infrastructure (e.g. roads, digital networks), thereby improving the overall attractiveness of the regions. It can also be a source of demand for local businesses (e.g. components, repair and monitoring services), encouraging the creation of local supply chains and strengthening local business networks. Finally, it can be a source of innovation, providing performance data for future efficiency improvements in wind farm operation.

4. **Would you agree that normative value is balanced with monetary rate of return and efficiency of energy production?**
   In Poland, as in other European countries, the business case for wind farms is still largely driven by financial public support, in this case mostly in the form of support tenders. In general, this support is justified given the crucial role of wind energy in decarbonising the

energy system and supporting the electrification of energy-intensive applications in industry, buildings and transport. With increasing efficiency gains and high average electricity prices in Europe, the need for financial support to wind farm operators in Poland and other European countries will rapidly diminish. As a result, market returns will converge with the societal value of wind energy, facilitating optimal deployment through price-based investment incentives.

5. **Do you agree that the project benefits local communities? How about Polish citizens in general? Please, rate the degree of welfare in terms of the Margonin Wind Farm project specifically.**

   Omitted due to lack of specific knowledge of the socio-economic structure of the region.

The Margonin Wind Farm Project creates …	**Category**	1	2	3	4	5
	aesthetics			x		
	positive impact on lifestyle			x		
	new job opportunities (new income sources)				x	
***1** Disagree* ***2** Partially disagree*	addition to employment diversity					x

***3** Neutral* ***4** Partially agree* ***5** Fully agree*	poverty alleviation			x		
	Improved health & safety: public				x	
	improved health & safety: work			x		
	security and diversification of energy supply					x
	increased energy self-reliance					x
	improvement of local population's skills and education				x	
	technological advances and transfer				x	
	noise		x			
	impacts on the landscape			x		
	potential displacement and cultural heritage impacts			x		

6. **Do you agree that the EU's normative values have impacted the project?**
   The EU's transformation objectives are central to energy policy at Member State level. Through the National Energy and Climate Plans (NECPs), Member States are required to regularly document their national measures to support the overall EU renewable energy targets. This includes the wind energy support policies relevant to this project. In addition, through the EU Emissions Trading Scheme (EU ETS), the EU has defined the main framework for shaping investment incentives in wind energy by enforcing a market-based CO_2 price.

Dear Dr. Wolf, thank you so much for your valuable contribution! I will keep you updated on the progress of my Master's thesis.

European Investment Bank

Interview with Ms. Heike Freimuth, *Head of the EIB Group Office in Germany*

16.4.2025

Main takeaways for the Member State Poland:

- Substantial volume in the area of renewable energy
- Poland has accelerated a lot in terms of its green transition via wind energy

General Steps of EIB's process of investing in a green energy project:

1. Establish contact with relevant local authorities, including ministries and other stskeholders.
2. Ensure high visibility and promote the initiative effectively.
3. Conduct thorough due diligence, including financial, technical, investor-related and socio-ecological aspects.
4. Follow a structured due diligence process examining all project dimensions: economic, technical, financial, environmental, social, legal.
5. Engage with a broad range of stakeholders and potential financial partners. Evaluate the overall structure and coherence of the financial package.
6. Address comprehensive legal requirements throughout the project lifecycle.
7. Involve a risk-management team covering financial, promotional, technical, and construction aspects. Follow a multi-step approval process, beginning with a preliminary agreement to engage. Conduct a comparative analysis and prepare a financial proposal for submission to the managerial committee.
8. Negotiation
9. Signature
10. Disbursement
11. Monitoring of impact
12. Justify the involvement of a public EU institution by demonstrating the EIB's catalytic role as promotional bank—one that cannot be fulfilled by commercial banks.
13. Highlight the EIB's value-added benefits: better financial terms (duration, longer commitment and grace period, interest rate), larger financing volumes, and the ability to catalyze/leverage additional investment. Demonstrate the EIB's role in crowding in other financial institutions, enhancing the overall investment impact. Establish credibility and comfort for other investors through EU validation ("EU-proofed" projects). Support innovative or first-of-a-kind technologies typically avoided by traditional banks.