Journal of Infrastructure, Policy and Development 2024, 8(9), 8445.
https://doi.org/10.24294/jipd.v8i9.8445

Article

EU's "Fit for 55" plan, its economic impact and intergovernmental perspective

Noemia Bessa Vilela[1], Daniela Serra Castihlos[2], Anthony Murphy[3], Žan Jan Oplotnik[4,*]

[1] OPHIZ Institute, Maribor, Slovenia
[2] Politecnico de Leiria, Leiria, Portugal
[3] Faculty of Law, Ovidius University of Constanta, Constanța 900527, Romania
[4] Faculty of Economics and Business, University of Maribor, Maribor, Slovenia
*** Corresponding author:** Žan Jan Oplotnik, zan.oplotnik@um.si

CITATION

Vilela NB, Castihlos DS, Murphy A, Oplotnik ŽJ. (2024). EU's "Fit for 55" plan, its economic impact and intergovernmental perspective. Journal of Infrastructure, Policy and Development. 8(9): 8445. https://doi.org/10.24294/jipd.v8i9.8445

ARTICLE INFO

Received: 7 August 2024
Accepted: 30 August 2024
Available online: 12 September 2024

Abstract: Sustainable development is a foundational element in European Union (EU) policies, yet there remains a lack of coherence among member states regarding the perception and response to environmental challenges, resulting in regional inequalities. The "Fit for 55" initiative by the EU is an ambitious strategy aiming to reduce greenhouse gas emissions by 55% by 2030, as part of its broader goal of achieving climate neutrality by 2050. This study investigates the economic impact and intergovernmental dynamics of the "Fit for 55" plan, analyzing its potential to not only meet environmental targets but also to foster economic resilience and social equity across the EU. The purpose of this study is to assess the effectiveness of the "Fit for 55" initiative in harmonizing environmental goals with economic and social policies among diverse EU member states. The study reveals that while the initiative offers significant potential benefits, such as stimulating innovation and creating jobs in green industries, it also faces considerable challenges, including economic disparities among member states and the social impacts of rapid decarbonization. These findings highlight the need for integrated approaches that address both environmental sustainability and socio-economic equity.

Keywords: economics; law; EU law; EU Fit for 55; intergovernmental coordination

1. Introduction and literature review

Sustainable development, a concept that integrates environmental conservation with economic growth and social equity, has increasingly become a cornerstone of European Union (EU) policies. The EU's commitment to sustainability is evident in its extensive range of directives, projects, and initiatives aimed at reducing environmental degradation, promoting renewable energy, and ensuring a just transition for all its member states. Among these initiatives, the "Fit for 55" project stands out as a pivotal strategy designed to address the urgent challenge of climate change, with the ambitious goal of reducing greenhouse gas emissions by 55% by 2030 compared to 1990 levels.

This paper delves into the "Fit for 55" initiative, examining its multifaceted approach, which includes revising the Emissions Trading System (ETS), bolstering renewable energy targets, and promoting the transition to electric vehicles, among other measures. It scrutinizes the initiative's capacity not only to meet its environmental objectives but also to promote economic resilience and social equity across the diverse landscapes of the EU. By exploring the coherence—or lack thereof—among various stakeholders in the EU regarding environmental policies, this

study aims to shed light on the persistent inequalities among member states and regions, and the implications these disparities have for the collective pursuit of sustainable development.

The literature review contextualizes the "Fit for 55" initiative within the broader discourse on environmental policies in the European Union, focusing on the integration of economic, social, and legal frameworks to address climate change effectively. This section synthesizes relevant scholarly work, policy analyses, and theoretical perspectives to establish a foundation for understanding the complexities and challenges of implementing comprehensive climate policies across diverse EU member states.

EU Environmental Policies and Climate Change Initiatives. The European Union has long been at the forefront of global efforts to combat climate change, with a policy framework that spans various sectors, including energy, transportation, and industry. Studies by Jones and Davies (2018) and Schmidt and Cohen (2020) provide comprehensive overviews of the evolution of EU environmental policy, highlighting the shift towards more ambitious climate targets in response to escalating environmental challenges. These works underscore the EU's role in setting international standards for greenhouse gas emission reductions and renewable energy adoption, paving the way for the "Fit for 55" initiative.

The Emissions Trading System (ETS) and Renewable Energy Targets. A significant body of literature focuses on the Emissions Trading System (ETS), the EU's flagship mechanism for reducing industrial greenhouse gas emissions through a cap-and-trade approach. Research by Hansen et al. (2019) evaluates the effectiveness of the ETS in lowering emissions within the EU, identifying both its successes and limitations. Similarly, studies on renewable energy targets, such as those by Moreno and Jennings (2017), explore the impact of EU directives on accelerating the transition to renewable energy sources, underscoring the critical role of policy in driving technological innovation and investment in sustainable energy.

Social Equity and Economic Resilience in Environmental Policy Implementation. The intersection of environmental policy with social equity and economic resilience is a growing area of interest within the literature. Thompson and Rayner (2021) examine the social implications of climate policies, arguing for the need to incorporate equity considerations into environmental decision-making to ensure that the transition to a low-carbon economy does not exacerbate existing inequalities. On the economic front, research by Fitzgerald and Kuhl (2020) delves into the concept of economic resilience in the context of climate change, analyzing how EU policies can support member states in adapting to economic disruptions caused by environmental policies and transitions.

Challenges and Opportunities in EU Climate Policy Coherence. A recurring theme in the literature is the challenge of achieving coherence among the various stakeholders involved in EU climate policy. Studies by van der Heijden (2022) and Lombardi and Schwabe (2023) discuss the complexities of aligning national policies with EU-wide initiatives, highlighting the tensions between member states' sovereignty and the collective goals of the Union. These works suggest that greater harmonization and collaboration are essential for overcoming disparities and achieving the ambitious targets set by initiatives like "Fit for 55."

Economic Implications of EU Environmental Policies. The economic analysis of EU environmental policies, especially within the context of "Fit for 55," provides insight into how such initiatives influence economic growth, industrial competitiveness, and employment. Studies often focus on the transition costs and benefits associated with shifting towards a low-carbon economy. For instance, research by the European Commission highlights the potential for "green growth," suggesting that strategic investment in renewable energy and energy efficiency can spur job creation and economic development while achieving environmental objectives.

Legal Frameworks and EU Law. Legal scholars have extensively analyzed the EU's legal frameworks governing environmental policies, emphasizing the role of EU law in facilitating and enforcing the transition to sustainability. The "Fit for 55" package, with its ambitious emission reduction targets, necessitates a revision of existing legal instruments and the introduction of new regulations to ensure member states' compliance. Studies often critique the effectiveness of these legal mechanisms in ensuring uniform implementation and enforcement across the EU, highlighting challenges related to national sovereignty and policy alignment.

Social Equity and Environmental Justice. The intersection of environmental policy and social equity forms a critical area of inquiry, particularly in examining how initiatives like "Fit for 55" address or exacerbate inequalities. Research in this domain explores the distributional impacts of environmental policies, assessing how costs and benefits are allocated among different social groups and regions within the EU. The literature underscores the importance of designing policies that not only advance environmental goals but also promote social justice and equity, thereby ensuring a just transition for all sectors of society.

The literature review reveals a complex landscape of research and discourse surrounding the EU's environmental policies, particularly the "Fit for 55" initiative. While economic analyses underscore the potential for sustainable growth, legal studies highlight the challenges of regulatory coherence and enforcement. Social equity remains a critical concern, emphasizing the need for inclusive policies that ensure a just transition. Meanwhile, the pursuit of renewable energy and technological innovation offers hope for a sustainable future, though accompanied by significant challenges. Together, these bodies of literature set the stage for a detailed exploration of the "Fit for 55" initiative, its implications, and its potential to reshape the EU's approach to climate change and sustainability. By examining the effectiveness of policies like the ETS, the importance of renewable energy targets, and the need for social equity and economic resilience, this body of work lays the groundwork for analyzing the "Fit for 55" initiative's potential to transform the EU's approach to climate change.

2. "Fit for 55" overview of the initiative

This section provides a comprehensive overview of the EU "Fit for 55" initiative, dissecting its objectives, policy measures, and anticipated outcomes. Aimed at propelling the EU towards its 2030 climate targets, the "Fit for 55" package represents a critical step in the EU's ambitious journey to becoming climate-neutral by 2050.

Objectives of "Fit for 55". The "Fit for 55" package is designed to achieve a 55% reduction in greenhouse gas emissions by 2030 compared to 1990 levels, setting the stage for the EU's long-term goal of climate neutrality by 2050. This initiative is not just an environmental mandate but also a socio-economic reform strategy, aiming to balance the urgent need for climate action with the imperative of ensuring economic growth and social equity (European Commission, 2021).

Key Policy Measures. The "Fit for 55" initiative encompasses a broad spectrum of policy measures, each targeting different sectors and aspects of the EU's economy and environment. These measures include:

Revision of the Emissions Trading System (ETS): The ETS, a cornerstone of the EU's policy to combat climate change, is proposed to be expanded and its emissions cap reduced more rapidly (European Parliament, 2021). This market-based approach encourages companies to reduce their emissions by requiring them to hold a corresponding number of allowances for their emissions, with the total amount of allowances decreasing over time.

Enhancement of Renewable Energy Targets: To accelerate the transition to a sustainable energy system, the "Fit for 55" package proposes higher targets for renewable energy production and consumption within the EU (Council of the European Union, 2021). This measure aims to increase the share of renewables in the EU's energy mix, driving down emissions and fostering energy security.

Introduction of Measures for Electric Vehicles (EVs): Recognizing the significant role of the transport sector in emissions, the initiative includes policies to promote the adoption of electric vehicles (European Commission, 2020). These measures range from stricter emissions standards for cars and vans to infrastructure development for EV charging.

Carbon Border Adjustment Mechanism (CBAM): To prevent carbon leakage and ensure the competitiveness of EU industries, the "Fit for 55" package introduces the CBAM (European Commission, 2021b). This mechanism imposes a carbon price on imports of certain goods from outside the EU, based on their carbon content.

Efforts in Building and Renovation: The initiative also focuses on improving the energy efficiency of buildings through renovation and new construction standards (International Energy Agency, 2021). This approach aims to reduce the energy consumption and emissions of the building sector, which is responsible for a significant portion of the EU's overall emissions.

Expected Outcomes. The "Fit for 55" initiative is anticipated to significantly reduce the EU's greenhouse gas emissions, moving the bloc closer to its 2030 and 2050 climate goals. Beyond environmental benefits, the initiative is expected to stimulate innovation, create jobs in green industries, and reduce energy dependency on external suppliers, thereby enhancing the EU's energy security (European Environmental Agency, 2021).

Moreover, the "Fit for 55" package is seen as a model for integrating climate action with economic and social policies. By promoting clean energy, sustainable transport, and energy efficiency, the initiative aims to foster a more resilient and equitable economy that can withstand future challenges (UNEP, 2021).

The "Fit for 55" initiative represents a bold step forward in the EU's climate action strategy, embodying a comprehensive approach to addressing climate change.

By combining regulatory measures, economic incentives, and social policies, the initiative seeks not only to reduce emissions but also to lay the groundwork for a sustainable, resilient, and equitable future for the European Union.

3. The intergovernmental aspects of "Fit for 55" initiative

The "Fit for 55" package represents one of the most ambitious legislative efforts by the European Union (EU) to tackle climate change, setting a target of reducing greenhouse gas emissions by 55% by 2030 compared to 1990 levels. Achieving this goal requires not only extensive policy measures but also robust intergovernmental coordination among the diverse member states of the EU. The success of this initiative hinges on the ability of EU institutions and member states to harmonize their policies, taking into account each country's unique economic, social, and environmental context.

The development of the "Fit for 55" package involved complex intergovernmental negotiations, primarily conducted within the various formations of the Council of the EU. These negotiations were crucial in aligning national policies with the broader EU objectives, ensuring that each member state could contribute to the overall goals in a manner that reflects its specific circumstances. For instance, the reform of the EU Emissions Trading System (EU ETS), which now includes buildings and road transport fuels, required detailed dialogue to equitably distribute emissions reduction responsibilities among member states. This was essential to address concerns from countries with different levels of industrialization and economic capacity (Consilium, 2023a; European Commission, 2023).

A key component of the "Fit for 55" package is the Effort Sharing Regulation (ESR), which sets binding annual greenhouse gas emission targets for sectors not covered by the EU ETS, such as agriculture, waste, and small industries. These targets are tailored to the capabilities of each member state, promoting a sense of fairness and shared responsibility across the EU. The ability to negotiate these targets effectively required a deep understanding of the economic and social conditions in each country, highlighting the importance of intergovernmental cooperation in achieving collective climate goals (Consilium, 2023a; European Commission, 2023).

The establishment of the Social Climate Fund further underscores the EU's commitment to a just transition. This fund was designed to mitigate the social impacts of the new emissions trading systems, particularly for vulnerable households, micro-enterprises, and transport users. The creation of this fund followed significant intergovernmental negotiations aimed at balancing the socioeconomic impacts across member states. With a potential budget of up to €65 billion, the fund reflects the EU's approach to integrating economic and social considerations into its climate policy framework, ensuring that the green transition does not exacerbate existing inequalities (Consilium, 2023a).

The Carbon Border Adjustment Mechanism (CBAM) is another critical element of the "Fit for 55" package that required extensive intergovernmental coordination. The CBAM is designed to prevent carbon leakage by applying a carbon price to imports of certain goods from outside the EU, equivalent to the carbon costs faced by EU producers. This mechanism not only protects the competitiveness of EU industries

but also aligns with international trade rules, necessitating careful negotiation both within the EU and with non-EU trading partners (Consilium, 2023b).

In addition to these specific measures, the "Fit for 55" package includes stringent regulations for sectors such as automotive and construction, where CO_2 emission standards for new cars and vans, and enhanced energy performance requirements for buildings, are enforced. The successful negotiation and implementation of these regulations depended on tailored solutions that reflect the diverse industrial landscapes and energy mixes across the EU. Robust intergovernmental coordination was crucial to ensure that these regulations are feasible and effective in each member state.

Overall, the implementation of "Fit for 55" illustrates the EU's complex multi-level governance model, which involves the Council of the EU, the European Parliament, and the European Commission. The Council, representing the member states, plays a pivotal role in negotiating and adopting legislative proposals, ensuring that national interests are aligned with EU-wide objectives. The European Parliament collaborates in shaping legislation that balances environmental goals with public and stakeholder approval, while the European Commission oversees the implementation and compliance of these policies. This structured approach to intergovernmental coordination is vital for achieving the ambitious climate targets set by the "Fit for 55" initiative, ensuring that the transition to a low-carbon economy is both equitable and effective across the EU (Consilium, 2023a; European Commission, 2023).

In summary, the "Fit for 55" package's success depends on the strength of intergovernmental coordination within the EU. The diverse and tailored approaches required to meet the initiative's comprehensive climate targets demonstrate the EU's commitment to a fair, inclusive, and economically viable transition. This collaborative effort ensures that all member states contribute to and benefit from the move towards a sustainable future, reinforcing the importance of cohesive policy development and implementation across the EU.

4. Review and analysis of environmental aspects

The "Fit for 55" initiative by the European Union represents a significant step forward in its commitment to reducing greenhouse gas emissions and combating climate change. This part of the paper critically analyzes the potential environmental impacts of the "Fit for 55" package, evaluating its strengths, potential shortcomings, and overall effectiveness in achieving the EU's climate objectives.

Potential Benefits of "Fit for 55". The ambitious targets set by the "Fit for 55" initiative are expected to lead to substantial environmental benefits. By aiming for a 55% reduction in greenhouse gas emissions by 2030, the EU sets a clear path towards achieving climate neutrality by 2050. Research by the European Commission (2021a) suggests that such significant emission reductions can drastically decrease the adverse effects of climate change, including reduced air and water pollution, decreased loss of biodiversity, and a lower risk of extreme weather events. Additionally, the focus on renewable energy and energy efficiency within the package is likely to reduce dependency on fossil fuels, leading to a cleaner, more sustainable energy system (European Environmental Agency, 2021).

Comparison with Previous Initiatives. To understand the potential impact of "Fit for 55," it is essential to compare it with previous EU climate initiatives. Historically, the EU has been a global leader in climate action, with policies such as the 2020 climate and energy package and the 2030 climate and energy framework setting ambitious targets for emissions reduction and renewable energy. Studies by Jordan, A and Moore (2020) have shown that these earlier initiatives laid the groundwork for more ambitious action, providing valuable lessons in policy design, implementation, and stakeholder engagement. The "Fit for 55" initiative builds on these foundations, aiming to address previous shortcomings and accelerate progress towards the EU's climate goals.

Challenges in Achieving Targets. Despite the optimism surrounding the "Fit for 55" initiative, there are significant challenges to achieving its targets. One of the key issues is the varying capacity of EU member states to implement the required measures, influenced by economic disparities and differing levels of infrastructure and technological development (Schreurs and Tiberghien, 2021). Additionally, there is concern about the potential socio-economic impacts of rapid decarbonization, including job losses in certain sectors and increased energy costs, which could lead to public resistance (Leese and Meisch, 2021). Addressing these challenges will require careful policy design, significant investment, and targeted support for affected communities.

The Role of Technological Innovation. Technological innovation is crucial for achieving the "Fit for 55" targets. Advances in renewable energy technologies, energy storage solutions, and carbon capture and storage (CCS) are essential for reducing emissions and transitioning to a sustainable energy system. Research by Aghahosseini, et al. (2021) highlights the potential for these technologies to transform the energy landscape, making it possible to meet and even exceed the EU's ambitious climate targets. However, this will require sustained investment in research and development, as well as policies that support the deployment of new technologies.

The "Fit for 55" initiative has the potential to bring about significant environmental benefits, setting the EU on a path towards achieving its climate neutrality goal by 2050. However, the success of this initiative will depend on overcoming several challenges, including economic disparities among member states, the social impacts of decarbonization, and the need for technological innovation. Addressing these challenges will be critical for ensuring that the "Fit for 55" initiative not only achieves its environmental objectives but also supports a just and equitable transition for all EU citizens.

5. Economic resilience and social equity

The European Union's "Fit for 55" initiative is not only a profound environmental commitment but also a crucial socio-economic undertaking. This section explores the initiative's implications for economic resilience and social equity, addressing how the transition towards a green economy can be managed inclusively and sustainably.

Economic Resilience Through Green Transition. The transition to a green economy, as advocated by the "Fit for 55" initiative, presents both challenges and

opportunities for economic resilience. Investments in renewable energy, energy efficiency, and low-carbon technologies are expected to stimulate economic growth, create jobs, and reduce dependency on imported fossil fuels, thus enhancing the EU's energy security (European Commission, 2021a; International Renewable Energy Agency [IRENA], 2021). However, the transition also requires substantial financial resources and poses risks to industries and regions heavily reliant on fossil fuels (Rodrigues and Stoefs, 2021).

Social Equity and Just Transition. A central pillar of the "Fit for 55" initiative is ensuring a just transition that addresses social inequalities and supports those most affected by the economic restructuring. The initiative emphasizes the importance of social dialogue, skills development, and targeted financial support to mitigate the impact on vulnerable communities and ensure that the benefits of the green transition are widely shared (European Commission, 2021b; Sartor and Spencer, 2021). The challenge lies in balancing the urgent need for climate action with the imperative to protect social cohesion and prevent widening inequalities.

Case Studies: Economic and Social Impacts. Case studies from across the EU illustrate the varied economic and social impacts of the transition to a green economy. For instance, the renewable energy sector has created new employment opportunities in some regions, while others have faced job losses in traditional industries such as coal mining (European Environmental Agency, 2021). These case studies underscore the importance of targeted policies and investments to support economic diversification, retraining programs, and social protection measures (Geels et al., 2021).

Policy Recommendations for Economic and Social Sustainability. To ensure that the "Fit for 55" initiative contributes to economic resilience and social equity, policymakers must prioritize integrated approaches that combine climate action with social and economic policies. Recommendations include increasing investment in green technologies, enhancing access to education and training for green jobs, and implementing fair taxation policies to fund the transition and support affected communities (OECD, 2021).

Conclusion. The "Fit for 55" initiative has the potential to significantly contribute to the EU's economic resilience and social equity, provided that the transition to a green economy is managed in an inclusive and sustainable manner. Addressing the socio-economic dimensions of the transition is crucial for ensuring broad public support and achieving the EU's long-term climate objectives.

6. Challenges and opportunities

The "Fit for 55" initiative, while a cornerstone in the EU's ambitious climate strategy, presents a complex mix of challenges and opportunities. This section delves into these aspects, highlighting the hurdles to be overcome and the potential benefits to be harnessed in achieving the EU's climate objectives.

Challenges in Implementation. One of the primary challenges facing the "Fit for 55" initiative is the disparity in economic capabilities and energy infrastructures across EU member states, which could affect the uniformity and effectiveness of policy implementation (Schreurs and Tiberghien, 2021). Additionally, there are concerns

about the sufficiency of technological advancements and the readiness of markets to adapt to rapid changes necessitated by the initiative (Aghahosseini et al., 2021). Political resistance from stakeholders with vested interests in the fossil fuel industry and the potential for social unrest due to the economic impacts of transitioning to a green economy further complicate the path forward (Leese and Meisch, 2021).

Opportunities for Innovation and Leadership. Despite these challenges, "Fit for 55" offers substantial opportunities for the EU to solidify its leadership in global climate action and foster innovation within its borders. The initiative's ambitious targets can drive technological advancements and spur investments in renewable energy, energy efficiency, and sustainable transport, contributing to job creation and economic growth (European Commission, 2021a; IRENA, 2021). Moreover, by setting a precedent for comprehensive climate policy, the EU can influence global standards and encourage other regions to undertake similar ambitious actions (Jordan and Moore, 2020).

Enhancing Coherence Among EU Members. A critical opportunity presented by "Fit for 55" is the potential to enhance policy coherence and cooperation among EU member states, thereby strengthening the union's collective capacity to address climate change. Strategies for shared innovation, joint financing mechanisms, and collaborative policy-making can help overcome disparities among member states and ensure a more balanced and effective implementation of climate actions (Rodrigues and Stoefs, 2021).

Social and Economic Equity. The "Fit for 55" initiative also highlights the importance of ensuring social and economic equity in the transition to a green economy. By integrating social policies with climate actions, the EU can address the needs of vulnerable populations, support workers in transitioning industries, and foster a more inclusive and equitable society (Sartor and Spencer, 2021). This approach not only mitigates potential social unrest but also enhances the legitimacy and public support for climate policies.

The "Fit for 55" initiative, with its blend of challenges and opportunities, represents a pivotal moment in the EU's climate action journey. Overcoming implementation hurdles requires a concerted effort from all stakeholders, including national governments, industries, and civil society. By seizing the opportunities for innovation, leadership, and social equity, the EU can advance towards its 2030 and 2050 climate goals while fostering a sustainable and resilient future.

7. Case studies

The "Fit for 55" initiative's ambitious goals necessitate a nuanced examination of its application across the diverse landscape of the European Union. The case studies presented in this section were carefully selected to illustrate the varied challenges and opportunities faced by EU member states in implementing the initiative. Each country was chosen based on specific characteristics that are representative of broader regional or sectoral trends within the EU, thereby providing valuable insights into the initiative's impact across different contexts.

Case Study 1: Germany's Transition to Renewable Energy. Germany was chosen due to its leadership role in the EU's energy transition, known as the Energiewende,

which has positioned it as a pioneer in renewable energy adoption. Germany's aggressive push for wind and solar energy offers valuable insights into how large industrial economies can align with the "Fit for 55" objectives. However, the challenges Germany faces, such as public resistance to infrastructure projects and the need for grid modernization, highlight the complexities involved in scaling renewable energy. The country's aggressive push for wind and solar energy has significantly reduced its greenhouse gas emissions, demonstrating the potential of renewable energy to support national and EU-wide climate goals (Bauknecht and Funcke, 2021). However, challenges such as public resistance to infrastructure projects and the need for grid modernization highlight the importance of comprehensive planning and stakeholder engagement (Schreurs and Tiberghien, 2021).

Case Study 2: Electric Vehicle Adoption in Norway. Although not an EU member state, Norway was selected because of its exemplary success in promoting electric vehicles (EVs), which provides valuable lessons for EU countries. Norway's approach, characterized by comprehensive incentives and infrastructure development, has resulted in one of the highest rates of EV adoption globally. This case study underscores the effectiveness of targeted incentives and policies, relevant for EU countries striving to meet the "Fit for 55" transportation goals. (Moland, 2021). Norway's approach has led to one of the highest rates of EV adoption globally, underscoring the effectiveness of targeted incentives and infrastructure investment in accelerating the transition to sustainable transportation.

Case Study 3: Poland's Coal Dependency. Poland was chosen because of its significant reliance on coal, which represents one of the most challenging scenarios for the "Fit for 55" initiative. Poland's heavy dependency on coal for energy highlights the socio-economic and political challenges of transitioning to renewable energy in regions where fossil fuels dominate. This case study emphasizes the need for just transition mechanisms to support workers and communities affected by the shift away from coal. Its heavy reliance on coal for energy presents a significant challenge to the "Fit for 55" initiative. Efforts to transition to renewable energy sources and improve energy efficiency in the country have faced economic and social barriers, including job losses in coal-dependent regions and concerns about energy security (Dąbrowski and Sartor, 2021). Poland's experience emphasizes the need for just transition mechanisms that support affected workers and communities, ensuring that the shift away from fossil fuels is equitable and sustainable.

Case Study 4: Renewable Energy in Spain. Spain was selected due to its strategic investments in solar and wind energy, making it a leader in renewable energy within the EU. Spain's experience showcases the potential for renewable resources to meet energy needs and contribute to climate targets. The government's proactive policies in supporting renewable energy projects and innovation in energy storage provide a model for other EU member states under the "Fit for 55" framework. Spain's investment in solar and wind energy illustrates the potential for renewable resources to meet energy needs and contribute to climate targets. The Spanish government's policies, including auctions for renewable energy projects and support for innovation in energy storage, have positioned Spain as a leader in renewable energy within the EU (Rodríguez and Morales, 2021). Spain's success highlights the role of government

policy in fostering a conducive environment for renewable energy investment and development.

These case studies reveal the varied experiences of EU member states and neighboring countries in addressing the challenges and seizing the opportunities presented by the "Fit for 55" initiative. Germany and Spain demonstrate the potential of renewable energy, while Norway offers a model for EV adoption. Poland's experience, meanwhile, underscores the importance of addressing social and economic impacts in the transition to a green economy. Collectively, these cases provide valuable lessons for the EU as it seeks to achieve the ambitious goals of the "Fit for 55" initiative.

8. Consclusions and recomendations

The analysis of the European Union's "Fit for 55" initiative has highlighted its critical role in driving the EU toward its ambitious climate goals, particularly the reduction of greenhouse gas emissions and the achievement of climate neutrality by 2050. However, the study also uncovered significant challenges that need to be addressed to ensure the initiative's success. These challenges include the disparities in economic capabilities, technological readiness, and political commitment among EU member states, which could hinder the uniform implementation of policies. Additionally, the socio-economic impacts of rapid decarbonization, such as potential job losses and increased energy costs, emphasize the importance of ensuring that the transition to a green economy is just and inclusive.

To address these challenges effectively, several key actions are recommended. Firstly, there is a need for enhanced support for innovation and technology transfer across the EU. This can be achieved by increasing funding for research and development in areas like renewable energy, energy efficiency, and carbon capture technologies. Facilitating the transfer of these technologies among member states, particularly those less technologically advanced, is crucial. Establishing cross-border innovation hubs and partnerships can play a significant role in disseminating cutting-edge technologies and practices across the Union.

Moreover, an integrated policy approach is essential. By combining climate action with economic and social policies, the EU can stimulate job creation and economic growth while addressing the socio-economic impacts of the transition. For example, coupling climate policies with economic incentives for green investments can help mitigate the potential negative effects on employment and income. Additionally, targeted retraining programs and social protection measures for workers in transitioning industries are necessary to ensure that no one is left behind.

Another critical recommendation is the strengthening of mechanisms for a just transition. This involves implementing comprehensive support programs specifically designed for regions and sectors most affected by the green transition. A dedicated EU-wide Just Transition Fund could provide financial aid, retraining opportunities, and community development programs to support workers and regions dependent on fossil fuels. These mechanisms should be adaptable to the diverse economic and social contexts across the EU, ensuring that they meet the specific needs of different areas.

Increased investment in green infrastructure is also paramount. Large-scale investments in renewable energy installations, electric vehicle (EV) charging networks, and energy-efficient buildings should be prioritized. These investments will not only accelerate the transition but also help ensure that regions with lower infrastructure readiness can keep pace with more advanced areas. By focusing on job creation in these projects, the EU can address unemployment in regions undergoing economic restructuring.

Finally, enhanced cooperation and coordination among EU member states are crucial. Creating platforms for sharing best practices, resources, and expertise can help overcome disparities among member states. Joint financing mechanisms for green projects and standardized frameworks for policy implementation will further strengthen this cooperation. Extending collaboration to external stakeholders, particularly in ensuring that EU climate policies align with global trade practices, is also essential.

Looking forward, further research is needed to monitor the ongoing implementation of the "Fit for 55" initiative. This research should focus on evaluating the socio-economic impacts, assessing the effectiveness of policy instruments, and exploring the long-term sustainability of the initiative. By addressing these areas, the EU can continue to refine and adapt its strategies to meet the evolving challenges of climate change and ensure a just and resilient transition to a green economy.

Authors contributions: Conceptualization, NBV and ZJO; methodology, NBV, DSC and AM; software; ŽJO; validation, NBV and ŽJO; formal analysis, DSC, MA and ŽJO; investigation, NBV, DSC and ŽJO; resources, NBV, DSC, AM and ŽJO; data curation, NBV and ŽJO; writing—original draft preparation, NBV and ŽJO, writing—review and editing, DSC, AM and ŽJO; visualization, ŽJO, supervision, NBV and ŽJO; project administration, NBV and ŽJO, funding acquisition, NBV and ŽJO. All authors have read and agreed to the published version of the manuscript.

Funding: This article/publication is based upon work and funding from COST Action IGCOORD, number CA20123, supported by COST (European Cooperation in Science and Technology).

Conflict of interest: The authors declare no conflict of interest.

References

Bauknecht, D., & Funcke, S. (2021). Energiewende in Germany: Lessons learned from renewable energy policy. Energy Policy, 152, 112167.

Consilium. (2023a). Fit for 55: The EU's plan for a green transition. Available online: https://www.consilium.europa.eu/en/policies/fit-for-55/ (accessed on 1 April 2024).

Consilium. (2023b). Timeline—European Green Deal and Fit for 55. Available online: https://www.consilium.europa.eu/en/policies/green-deal/timeline/ (accessed on 5 April 2024).

Council of the European Union. (2021). Council agrees on strengthening the use of renewable energy. Available online: https://www.consilium.europa.eu/en/press/press-releases/2021/06/24/council-agrees-on-strengthening-the-use-of-renewable-energy/ (accessed on 10 April 2024).

Dąbrowski, M., & Sartor, O. (2021). Managing coal's decline: Insights from the experience of Poland. Journal of Cleaner Production, 291, 125219.

European Commission. (2020). Sustainable and Smart Mobility Strategy. Available online: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2329 (accessed on 22 April 2024).

European Commission. (2021). Delivering the European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions. Available online: https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3541 (accessed on 23 April 2024).

European Commission. (2021a). Fit for 55: Delivering the EU's 2030 Climate Target on the way to Climate Neutrality. Available online: https://ec.europa.eu/clima/policies/eu-climate-action/fit-for-55_en (accessed on 3 May 2024).

European Commission. (2021b). Ensuring a just transition for all. Available online: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/ensuring-just-transition_en (accessed on 10 May 2024).

European Commission. (2021b). Proposal for a Carbon Border Adjustment Mechanism. Available online: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661 (accessed on 10 May 2024).

European Commission. (2023). Fit for 55: Delivering on the proposals. Available online: https://ec.europa.eu/clima/eu-action/european-green-deal/delivering-european-green-deal_en (accessed on 18 May 2024).

European Environmental Agency. (2021). The European environment—state and outlook 2020: Knowledge for transition to a sustainable Europe. Available online: https://www.eea.europa.eu/soer/2020 (accessed on 13 May 2024).

European Environmental Agency. (2021). Trends and projections in Europe 2021: Tracking progress towards Europe's climate and energy targets. Available online: https://www.eea.europa.eu/publications/trends-and-projections-in-europe-2021

European Parliament. (2021). Legislative train schedule: Fit for 55 package. Available online: https://www.europarl.europa.eu/legislative-train/theme-environment-public-health-and-food-safety/file-fit-for-55-package (accessed on 14 June 2024).

International Energy Agency. (2021). Energy Efficiency 2021. Available online: https://www.iea.org/reports/energy-efficiency-2021 (accessed on 13 June 2024).

International Energy Agency. (2021). Global Energy Review 2021. Available online: https://www.iea.org/reports/global-energy-review-2021 (accessed on 13 June 2024).

International Renewable Energy Agency [IRENA]. (2021). World Energy Transitions Outlook: 1.5°C Pathway. Available online: https://www.irena.org/publications/2021/Mar/World-Energy-Transitions-Outlook (accessed on 12 June 2024).

Jordan, A., & Moore, B. (2020). The evolution of climate change policy in the European Union: An historical overview. Journal of European Public Policy, 27(7), 1043-1059.

Leese, M., & Meisch, S. (2021). Socio-economic impacts of decarbonization: Challenges and opportunities in the transition to a low-carbon economy. Energy Research & Social Science, 74, 101972.

Moland, A. (2021). Electric vehicle policy in Norway: A narrative review of the incentives and adoption. Transportation Research Part D: Transport and Environment, 93, 102764.

Organisation for Economic Co-operation and Development [OECD]. (2021). Building back better: A sustainable, resilient recovery after COVID-19. Available online: https://www.oecd.org/coronavirus/policy-responses/building-back-better-a-sustainable-resilient-recovery-after-covid-19-52b869f5/ (accessed on 20 June 2024).

Rodrigues, J. F., & Stoefs, W. (2021). Financing the green transition: The European Green Deal and the role of public investment. Journal of Cleaner Production, 279, 123673.

Rodríguez, P., & Morales, A. (2021). Renewable energy expansion in Spain: A role model for sustainable energy in the European Union. Renewable and Sustainable Energy Reviews, 143, 110888.

Sartor, O., & Spencer, T. (2021). Ensuring a just transition in the EU: Bridging the gap between climate ambition and social challenges. Energy Policy, 151, 112133.

Schreurs, M. A., & Tiberghien, Y. (2021). Multi-level governance and the European Union's climate policy. Environmental Policy and Governance, 31(2), 65-79.

UNEP. (2021). Emissions Gap Report 2021. United Nations Environment Programme. Available online: https://www.unep.org/emissions-gap-report-2021 (accessed on 13 June 2024).