



Driving Green: Economic Policies Fuelling Sustainable Mobility and Future Prospects in Poland

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Abstract

Poland is actively implementing economic policies to promote sustainable mobility, driven by the need to align with European Union (EU) directives and improve environmental sustainability. This paper aims to provide a comprehensive overview of these policies, focusing on emission standards, technology standards, performance standards and the use of taxes and subsidies. Data and methods include reviewing legislative documents, policy analysis and case studies from major Polish cities. The results indicate considerable progress in reducing emissions, promoting electric vehicles (EVs) and improving public transport infrastructure. However, challenges such as excessive costs and infrastructure constraints remain. The conclusion highlights the importance of continuous policy development and investments in sustainable technologies to achieve long-term environmental goals.

Keywords

Sustainable Mobility, Economic Policy Instruments, Emission Standards, Electric Vehicles (EVs)

1. Introduction

Sustainable mobility has become an essential focus for policymakers worldwide, especially in increasing urbanisation and environmental concerns (Buzási and Csete, 2015). In Poland, the pursuit of sustainable mobility is influenced by the need to comply with European Union (EU) regulations and the broader goal of reducing greenhouse gas emissions. This paper examines the economic policy instruments Poland has introduced to promote sustainable mobility, including emission standards, technology standards, performance standards, and taxes and subsidies (Reckien et al., 2023).

The concept of sustainable mobility encompasses various strategies to reduce the environmental impact of transport. These include the adoption of clean technologies such as electric vehicles (EVs), the introduction of low emission zones (LEZs), and the promotion of public transport and non-motorised modes of transport with the use of cognitive tools (Zöldy and Baranyi, 2023). Previous studies have highlighted the effectiveness of these measures in improving air quality and reducing the carbon footprint in urban areas (Zöldy et al., 2024; Török, 2017).

Poland's journey towards sustainable mobility began in the 1990s with the Euro Emissions Standards, which set limits on how much pollutants vehicles emit. Over the years, Poland has gradually tightened these standards and introduced additional measures such as the Electromobility and Alternative Fuels Act, which encourages the use of electric vehicles and the development of charging infrastructure. Despite these efforts, challenges remain, such as the high cost of electric vehicles and limited charging infrastructure in rural areas.



The central question of this article is to assess the effectiveness of Poland's economic policy instruments in promoting sustainable mobility and to identify areas where further improvements can be made. This topic is essential because achieving sustainable mobility is crucial for improving air quality, reducing greenhouse gas emissions and improving urban areas' overall quality of life. By examining Polish policies and their outcomes, this article aims to provide insights to inform future policy development and implementation.

2. Mobility Emission Standards in Poland

Poland's journey towards implementing emission standards for mobility began in the 1990s, driven by the rapid increase in motorisation and the associated deterioration of air quality. Initial efforts focused on aligning with European Union (EU) directives requiring stricter vehicle emission controls. Introducing Euro emission standards played a crucial role in shaping Poland's regulatory framework. These standards, ranging from Euro 1 to Euro 6, set limits on the amount of pollutants that vehicles are allowed to emit, including nitrogen oxides (NO_x), carbon monoxide (CO), hydrocarbons (HC) and particulate matter (PM) (Carasso et al., 2023).

Introduction of Euro standards: Poland introduced the Euro 1 standard in the mid-1990s and gradually moved to stricter standards. In 2015, the Euro 6 standard became mandatory for all new vehicles, significantly reducing the permitted emission levels (Carasso et al., 2023). In recent years, Poland has introduced Low Emission Zones (LEZs) in major cities such as Warsaw, which will come into force in July 2024. These zones restrict access for vehicles not meeting specific emission criteria based on the Euro standard (Fransen et al., 2023). The Electromobility and Alternative Fuels Act, enacted in 2018, promotes using electric and alternative fuel vehicles. It includes incentives for purchasing electric vehicles (EV) and developing charging infrastructure (Giuliano, 2012).

From 2024, Poland will continue to improve its emission standards and policies to align them with EU regulations and improve air quality. Key aspects of the status include the implementation of LEZs. Cities such as Warsaw are pioneering with the introduction of LEZs, which aim to reduce urban air pollution by restricting the entry of high-emission vehicles. These zones are expected to be expanded to other cities in the coming years (Fransen et al., 2023). Moreover, the government offers subsidies and tax incentives to encourage the adoption of electric vehicles. In addition, there is a strong push to expand the electric vehicle charging network nationwide (Giuliano, 2012).

Poland continues to enforce strict emission standards for new vehicles and ensures compliance with the latest Euro 6d-TEMP and Euro 7 standards (Carasso et al., 2023). Despite considerable progress, Poland faces challenges in fully implementing and enforcing emission standards. These include the excessive cost of electric vehicles, limited charging infrastructure in rural areas, and the need for educational campaigns to promote sustainable mobility practices.

Future directions include further integration of renewable energy sources for electric vehicle charging, expansion of LEZs and continuous adaptation to evolving EU regulations. Poland's commitment to reducing vehicle emissions is crucial to improving air quality and public health and achieving international climate goals.

3. Mobility-Related Technology Standards in Poland

Poland's approach to mobility-related technology standards has evolved significantly over the past decades, mainly due to the need to align with EU directives and improve environmental sustainability. Key focus areas have included fuel quality standards and the implementation of the Renewable Energy Directive (RED).

EU regulations have shaped Poland's fuel quality standards to reduce harmful emissions and improve air quality. Introducing the Euro standards for vehicle exhaust emissions was crucial in this process. These standards limit the pollutants vehicles emit, including fuel sulphur content (Carasso et al., 2023).

Early adoption: Poland started to align its fuel quality standards with EU directives in the early 2000s. The introduction of Euro 4 and 5 standards marked essential milestones, as the sulphur content in diesel and petrol was reduced to 50 ppm and 10 ppm, respectively (Carasso et al., 2023). Current standards: From 2024, Poland will comply with the Euro 6 standard, which further tightens the limits on sulphur content and other pollutants. This adjustment will ensure that Poland's fuel quality meets the highest standards in the EU (Carasso et al., 2023).

The Renewable Energy Directives (RED) are cornerstones of Poland's strategy to increase the share of renewable energy in the transport sector. The directive requires that a certain percentage of energy used in transport come from renewable sources.



1. RED I: The first Renewable Energy Directive (RED I), adopted in 2009, set a target for EU Member States to reach a 10% share of renewable energy in the transport sector by 2020. Poland implemented various measures to achieve this goal, including subsidies for biofuels and incentives for EVs (Mazur, 2022).

2. RED II: The revised directive (RED II), adopted in 2018, increased ambition by setting a target of at least 14% renewable energy in the transport sector by 2030. Poland has worked towards this goal by promoting advanced biofuels (Virt & Arnold, 2022) and expanding its EV infrastructure (Mazur, 2022).

Poland continues to make progress in implementing and enforcing mobility-related technology standards. Regarding fuel quality, Poland's compliance with Euro 6 standards ensures that fuel quality remains high, contributing to lower emissions and improved air quality (Carasso et al., 2023). The country is actively working towards RED II targets. These include increasing the share of renewable energy in the transport sector by promoting biofuels with a particular focus on innovative solutions, for example, pyro oils (Kondor, 2024) and expanding EV infrastructure (Mazur, 2022).

Although considerable progress has been witnessed, Poland faces challenges in fully implementing these standards. These include the high cost of renewable energy technologies, the need for further infrastructure development, and ensuring compliance across all sectors.

Future directions include continued alignment with EU regulations, increased investment in renewable energy technologies and public education campaigns to promote sustainable mobility practices. Poland's commitment to these standards is crucial for achieving its environmental and sustainability goals.

4. Mobility-Related Performance Standards in Poland

Poland's mobility-related performance standards have evolved significantly over the past few decades, primarily driven by the need to align with EU regulations and improve environmental sustainability. Key focus areas include new vehicle carbon dioxide (CO₂) emissions and the limitation of infrastructure use to reduce environmental impact.

New Vehicle CO₂ Emission Standards

Poland's efforts to introduce stricter CO₂ emission standards for new vehicles began in the early 2000s, following EU directives to reduce greenhouse gas emissions in the transport sector. The EU CO₂ emission standards for passenger and light commercial vehicles have significantly impacted Poland's regulatory framework. In the early adoption phase, Poland adopted the EU CO₂ emission standards, which initially set a target of 130 grams of CO₂ per kilometre (g CO₂/km) for new passenger cars by 2015 (Dybowski, 2021). This target was further reduced to 95 g CO₂/km by 2021 (Dybowski, 2021). From 2024, Poland will comply with the latest EU rules, which aim to reduce average CO₂ emissions from new cars by 55% below 2021 levels by 2030 (Dybowski, 2021). This ambitious target is part of the EU's broader strategy to achieve climate neutrality by 2050.

To complement efforts to reduce emissions, Poland has taken various measures to limit the use of infrastructure by high-emission vehicles and promote sustainable mobility. Large cities such as Warsaw have introduced low-emission zones that restrict access to vehicles that do not meet specific emission criteria (World Bank, 2015). These zones aim to reduce urban air pollution and promote using clean vehicles. On the other hand, urban mobility plans: Poland has developed sustainable urban mobility plans (SUMP) for several cities that focus on reducing traffic congestion, promoting public transport and improving cycling and pedestrian infrastructure (World Bank Group, 2020). These plans are part of a broader strategy to create more sustainable and liveable urban environments.

Poland continues to make progress in implementing and enforcing mobility-related performance standards. Critical aspects of the current status include tighter emission controls: Poland enforces strict CO₂ emission standards for new vehicles and ensures compliance with the latest EU regulations (EU Urban Mobility Observatory, 2023) and the implementation of LEZs will be expanded to more cities, with plans to restrict high-emission vehicles further and promote cleaner alternatives (World Bank, 2015). Promoting sustainable mobility is the third strategic direction; through Sustainable Urban Mobility Plans (SUMP) and other initiatives, Poland actively promotes sustainable mobility practices, including using public transport, cycling and walking (World Bank Group, 2020).

The challenges Poland faces in fully implementing these standards include the high cost of cleaner vehicles, the need for further infrastructure development, and ensuring public compliance with new regulations.



Future directions include continued alignment with EU regulations, increased investment in sustainable mobility infrastructure and public awareness campaigns to promote environmentally friendly practices. Poland's commitment to these standards is critical to achieving its environmental and sustainability goals.

5. Taxes and Subsidies as Regulatory Tools in Mobility

Poland's use of taxes and subsidies as regulatory tools in mobility has evolved significantly in recent decades, mainly due to the need to align with EU directives and improve environmental sustainability. These tools have been crucial in shaping the country's transport policy, promoting clean technologies and reducing emissions.

Poland has introduced various fuel taxes to discourage using emission-intensive vehicles. These taxes comply with EU regulations and aim to reduce fossil fuel consumption. Excise tax on fuel has been a key component, with higher rates applying to diesel and petrol (Government of Poland, 2023). Poland has also introduced differentiated vehicle registration taxes based on CO₂ emissions to encourage using environmentally friendly vehicles. Higher taxes are imposed on vehicles with higher emissions to encourage consumers to choose cleaner alternatives (Mazur, 2022).

Two main subsidies are used in Poland to promote alternative mobility forms. The country actively promotes the adoption of electric vehicles through various subsidies and incentives. The government offers financial incentives to purchase electric vehicles, including grants and tax breaks (Szalanski, 2024). These subsidies aim to make electric vehicles more affordable and attractive to consumers. Poland also provides subsidies for public transport systems to reduce dependence on private vehicles. These subsidies help maintain affordable fares and improve the quality and coverage of public transport services.

From 2024, Poland will further improve its regulatory framework by using taxes and subsidies to promote sustainable mobility. Key aspects of the current status include increased fuel taxes to comply with EU climate targets. These taxes are designed to reduce fossil fuel consumption and encourage the use of alternative energy sources (Government of Poland, 2023). The government has expanded its subsidy program for electric vehicles, offering higher grants and additional incentives for installing home charging stations (Mazur, 2022). This expansion is designed to accelerate the transition to electromobility. Meanwhile, Poland continues investing in public transport infrastructure, with significant subsidies for fleet modernisation and service expansion. These investments are crucial for reducing urban congestion and improving air quality.

Future directions include further alignment with EU regulations, increased investment in renewable energy infrastructure, and comprehensive strategies to support the transition to sustainable mobility. Poland's use of taxes and subsidies as regulatory tools is essential for achieving its environmental and sustainability goals.

6. Conclusions

Poland's path towards sustainable mobility, driven by the need to comply with EU directives and improve environmental sustainability, has shown significant progress by implementing various economic policy instruments. Introducing and enforcing emission standards, technology standards, performance standards, and the strategic use of taxes and subsidies have helped reduce emissions, promote the spread of EVs and improve public transport infrastructure.

Despite this progress, challenges remain, such as the high cost of electric vehicles, limited charging infrastructure in rural areas and the need for continuous public education on sustainable mobility practices. Addressing these challenges requires continuous policy development, increased investment in sustainable technologies and further alignment with evolving EU regulations.

Future efforts should focus on expanding low-emission zones, integrating renewable energy sources for charging electric vehicles and promoting innovative solutions such as advanced biofuels. By continuing to commit to these strategies, Poland can achieve its long-term environmental goals, improve air quality and increase the overall quality of life in urban areas.

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