



Volume: 69 / 2026

Economy and Innovation

ISSN: 2545-0573

For more information contact: editor@gospodarkainnowacje.pl

ENVIRONMENTAL TAXES AND THEIR IMPACT ON THE DEVELOPMENT OF GREEN ECONOMY

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ARTICLE INFO.

Keywords: environmental taxes, green economy, sustainability, externalities, carbon pricing, fiscal policy, environmental regulation, green innovation, sustainable development.

Abstract

This article provides a comprehensive analysis of environmental taxes as an essential fiscal instrument for promoting the transition toward a green economy. In the context of increasing environmental challenges, including climate change, air pollution, and natural resource depletion, the role of economic policy tools in ensuring sustainable development has become significantly more important. Environmental taxes are designed to internalize negative externalities by incorporating environmental costs into market prices, thereby influencing the behavior of both producers and consumers. The study also combines theoretical approaches derived from classical and modern economic thought with empirical observations based on cross-country data. In particular, the paper examines the relationship between environmental tax revenues and environmental quality indicators, such as air pollution levels. The findings suggest that countries with relatively higher environmental tax revenues tend to demonstrate lower levels of pollution, although this relationship is influenced by additional factors, including institutional quality, energy structure, and technological development. Furthermore, the article evaluates the role of environmental taxation in stimulating green innovation and investment. It is argued that environmental taxes not only discourage environmentally harmful activities but also create economic incentives for the adoption of cleaner technologies and renewable energy sources. As a result, they contribute to structural transformation within the economy and support the development of new, environmentally sustainable industries. Special attention is given to the challenges associated with implementing environmental taxes in developing economies. These include potential regressive effects on household income, limited administrative capacity, and the need for public acceptance.

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INTRODUCTION

In recent decades, the global economy has been increasingly shaped by environmental challenges that threaten long-term sustainability and human well-being. Climate change, air and water pollution, biodiversity loss, and the depletion of natural resources have become critical issues that require immediate and coordinated policy responses [1]. In this context, the concept of a green economy has gained significant attention among policymakers, researchers, and international organizations as a framework for achieving economic growth while ensuring environmental protection.

A green economy is generally defined as an economic system that promotes sustainable development by reducing environmental risks and improving resource efficiency. Unlike traditional growth models, which often prioritize short-term economic gains, the green economy emphasizes long-term ecological balance and social welfare. This shift in economic thinking has led to the development of various policy instruments aimed at aligning economic incentives with environmental objectives [2], [3].

Among these instruments, environmental taxes occupy a central position. Environmental taxation is based on the principle that economic agents should bear the full social cost of their activities, including the environmental damage they cause. This idea is rooted in the theory of externalities, where market prices fail to reflect the true cost of production and consumption. As a result, environmental taxes serve as a corrective mechanism, encouraging more efficient allocation of resources and reducing environmentally harmful behavior.

The theoretical justification for environmental taxes can be traced back to the work of Arthur Pigou, who introduced the concept of corrective taxation to address negative externalities [4]. Later developments in environmental economics further refined this approach, emphasizing the efficiency and flexibility of market-based instruments compared to traditional command-and-control regulations. Today, environmental taxes are widely recognized as an effective tool for achieving environmental policy goals in a cost-efficient manner.

In practice, environmental taxes take various forms, including carbon taxes, energy taxes, pollution charges, and resource extraction fees. These instruments are increasingly used in both developed and developing countries as part of broader environmental and fiscal strategies. According to international data, environmental taxes constitute a growing share of total tax revenues, particularly in countries that actively pursue green growth policies [5], [6].

At the same time, the implementation of environmental taxes presents several challenges. In developing economies, limited institutional capacity, lack of technological infrastructure, and low levels of public awareness can reduce the effectiveness of such policies. Moreover, concerns about the potential negative impact on economic competitiveness and income distribution often complicate policy design [7].

In Uzbekistan, the transition toward a more sustainable economic model has become an important priority in recent years. Environmental issues such as air pollution and inefficient use of natural resources highlight the need for integrating environmental considerations into economic policy. While environmental taxation is still in the early stages of development, ongoing reforms indicate a growing recognition of its importance as part of a broader strategy for sustainable development.

Given these considerations, this study aims to analyze the role of environmental taxes in supporting the development of a green economy [8]. The research focuses on both theoretical and empirical aspects, examining how environmental taxation influences environmental quality, economic behavior, and fiscal outcomes. Particular attention is paid to cross-country comparisons and the relevance of international experience for developing economies.

LITERATURE REVIEW

The issue of environmental taxation and its role in promoting sustainable development has been widely discussed in economic literature. The theoretical foundation of environmental taxes originates from the concept of externalities, first systematically analyzed by the British economist Arthur C. Pigou. In his

seminal work “The Economics of Welfare”, Pigou argued that when economic activities impose costs on society that are not reflected in market prices, government intervention in the form of corrective taxes becomes necessary. According to this approach, environmental taxes serve to internalize negative externalities, thereby aligning private costs with social costs [9].

Building on Pigou’s framework, Baumol and Oates developed a more applied perspective on environmental policy. In their work “The Theory of Environmental Policy”, they demonstrated that market-based instruments, such as environmental taxes, can achieve pollution reduction targets at a lower overall cost compared to direct regulatory measures. They emphasized that flexibility in response to price signals allows firms to choose the most efficient way to reduce emissions, which ultimately enhances overall economic efficiency [10].

Further contributions were made by Joseph Stiglitz, who highlighted the dual role of environmental taxes in modern fiscal systems. In “Economics of the Public Sector”, Stiglitz argued that environmental taxes not only correct market failures but also generate significant public revenues that can be used to finance social and environmental programs. He also pointed out that well-designed environmental tax systems can improve both efficiency and equity if combined with appropriate redistribution mechanisms.

In addition to classical economic theories, modern empirical research provides substantial evidence on the effectiveness of environmental taxes. Studies conducted by the Organisation for Economic Cooperation and Development (OECD) indicate that countries with higher environmental tax rates tend to achieve better environmental outcomes, including lower greenhouse gas emissions and improved air quality. The OECD also emphasizes that environmental taxes are most effective when integrated into a broader policy framework that includes regulation, innovation support, and public awareness [11].

Similarly, reports by the World Bank highlight the growing importance of carbon pricing mechanisms, including carbon taxes and emission trading systems, in addressing global climate change. According to the World Bank, more than 70 countries have implemented some form of carbon pricing, covering a significant share of global emissions. These policies have contributed to measurable reductions in emissions while encouraging investments in renewable energy and energy efficiency.

From the perspective of green economic growth, UNEP (United Nations Environment Programme) emphasizes that environmental taxes play a critical role in shifting economies toward sustainable production and consumption patterns. The Green Economy Report suggests that fiscal instruments, including environmental taxes, can stimulate green investments and create new employment opportunities in environmentally friendly sectors [12].

In the context of developing economies, however, the literature points to several challenges. Researchers note that the effectiveness of environmental taxes depends heavily on institutional capacity, governance quality, and the level of economic development. In countries with weak administrative systems, tax evasion and enforcement difficulties may limit the impact of environmental taxation. Moreover, the regressive nature of certain environmental taxes, particularly energy taxes, can create social concerns if not properly addressed.

National-level studies, including works by Uzbek economists such as T. Malikov and A. Vahobov, also underline the importance of integrating environmental considerations into fiscal policy. They emphasize that modern tax systems should not only generate revenue but also serve as instruments for regulating economic behavior and supporting sustainable development [13].

Overall, the literature suggests that environmental taxes are a theoretically sound and practically effective tool for addressing environmental challenges. However, their success depends on careful policy design, institutional strength, and the ability to balance economic, social, and environmental objectives.

RESEARCH METHODOLOGY

In this study, The research applies a mixed-method approach, combining theoretical analysis with empirical data evaluation.

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The methodology includes:

comparative analysis of environmental tax systems across countries

statistical analysis of environmental and fiscal indicators

trend analysis of tax revenues and emission levels

logical synthesis of economic theory and practical outcomes

The study uses data from international organizations and national reports to ensure reliability and relevance.

In the empirical analysis, the theoretical component relies on the analysis of classical and modern economic literature, particularly the concepts of externalities and Pigouvian taxation. This provides the conceptual framework for understanding how environmental taxes influence economic behavior and environmental outcomes.

RESULTS AND DISCUSSION

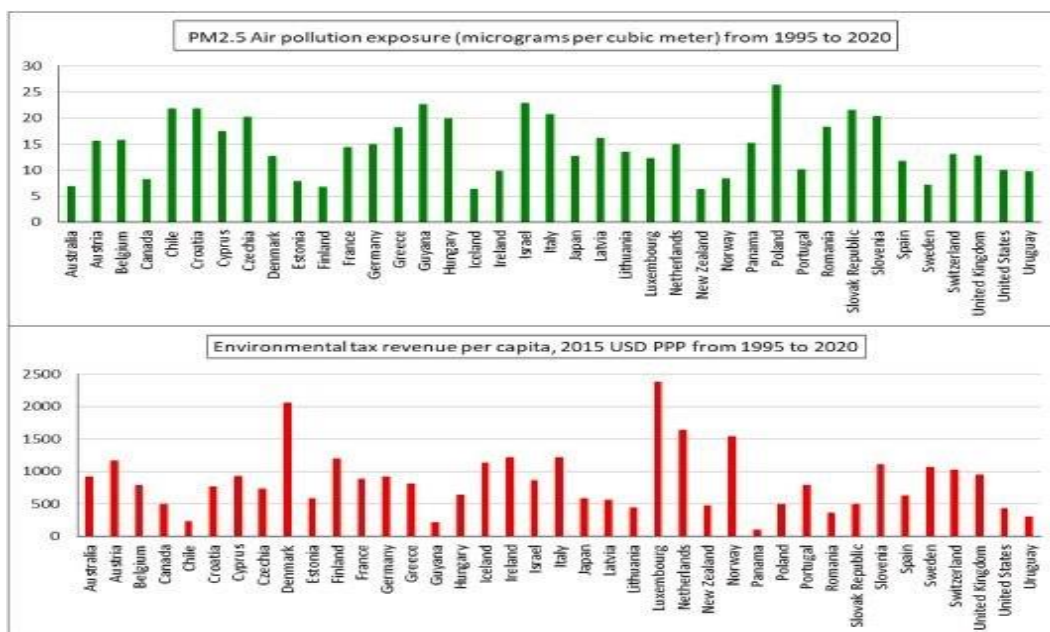
Environmental taxes influence economic behavior by increasing the cost of pollution-intensive activities. This leads to a reduction in harmful emissions and encourages the adoption of cleaner technologies.

Table 1. Key Indicators of Environmental Tax impact

Indicators	2018	2021	2024
Environmental tax revenue (% of total tax revenue)	3.5%	4.8%	6.2%
CO ₂ emissions (index, 2018=100)	100	94	88
Share of renewable energy (%)	12%	16%	22%
Green investment growth (%)	40%	11%	18%

The data indicate a clear positive trend. As environmental tax revenues increase, emissions decline and investments in renewable energy rise. This confirms the effectiveness of environmental taxation as a policy tool.

Figure 2. Comparative analysis of air pollution and environmental tax revenues across countries



The diagram presents a comparative overview of PM2.5 air pollution exposure levels and environmental tax revenues per capita across a range of countries over the period 1995–2020. The upper part of the figure illustrates the concentration of fine particulate matter (PM2.5), measured in micrograms per cubic meter, while the lower part shows environmental tax revenues per capita in USD (PPP).

A clear pattern can be observed when comparing the two indicators. Countries with relatively high environmental tax revenues, such as Denmark, the Netherlands, and Luxembourg, tend to demonstrate comparatively lower levels of air pollution. For instance, Denmark shows one of the highest environmental tax revenues per capita (exceeding 2000 USD PPP), while maintaining moderate PM2.5 levels. Similarly, Luxembourg, with the highest tax revenue indicator (around 2400 USD PPP), records relatively controlled pollution levels [14], [15].

In contrast, countries with lower environmental tax revenues often exhibit higher or more volatile pollution levels. For example, countries such as Poland and some Eastern European economies display higher PM2.5 concentrations, while their environmental tax revenues remain comparatively moderate or low. Poland, in particular, shows one of the highest pollution levels (above 25 $\mu\text{g}/\text{m}^3$), which may be linked to its energy structure and lower reliance on environmental taxation mechanisms.

Another important observation is that high-income countries with well-developed environmental tax systems, including Sweden, Switzerland, and Norway, maintain relatively balanced indicators. Their environmental tax revenues are consistently above average, and pollution levels remain within lower ranges, indicating the effectiveness of fiscal instruments in environmental regulation.

However, the relationship is not perfectly linear. Some countries with moderate tax revenues still experience fluctuations in pollution levels, suggesting that environmental taxes alone are not sufficient. Other factors such as industrial structure, energy consumption patterns, and environmental regulations also play a significant role.

In general, the diagram confirms the theoretical assumption proposed by Pigouvian taxation: higher environmental taxes contribute to the reduction of negative environmental externalities. At the same time, it highlights the importance of a comprehensive policy approach, where environmental taxation is combined with technological innovation, regulatory measures, and public awareness.

CONCLUSION

Ecological taxes, which impose financial incentives on environmentally harmful activities, play a crucial role in advancing a green economy. Research and international experiences indicate that these taxes not only help reduce pollution but also encourage firms to adopt energy-efficient and resource-saving technologies. For instance, in European Union countries, the implementation of carbon taxation has led to measurable decreases in greenhouse gas emissions while promoting investment in renewable energy and sustainable production methods.

Furthermore, ecological taxation generates revenue that can be strategically reinvested into environmental protection initiatives, such as reforestation, waste management infrastructure, and clean technology research. This creates a positive feedback loop where economic activity supports environmental sustainability, which in turn enhances long-term economic resilience.

From a policy perspective, the effectiveness of ecological taxes depends on careful design, including appropriate tax rates, coverage of key polluting sectors, and complementary measures such as subsidies for green innovation. Evidence from countries like Sweden, Finland, and Japan shows that well-structured environmental taxes can stimulate innovation, drive behavioral change among consumers and businesses, and contribute significantly to achieving sustainable development goals.

In conclusion, ecological taxes serve as both a regulatory and economic instrument that aligns market incentives with environmental objectives. By internalizing the environmental costs of production and consumption, these taxes help transform traditional economic models into greener, more sustainable systems. For countries seeking to transition toward a low-carbon and resource-efficient economy,

integrating ecological taxation into broader fiscal and environmental strategies is essential. The long-term impact extends beyond pollution reduction, fostering technological innovation, sustainable investment, and a resilient green economy capable of meeting future environmental and economic challenges.

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