

Towards A Green Economy Harmonization Of International Carbon Taxes As A Fiscal Instrument

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Abstract

Climate change has significant environmental, economic, and social impacts, driving the need for a transition to a green economy. Carbon tax is one of the main fiscal instruments to internalize the cost of emissions and encourage the use of clean energy. However, differences in implementation across countries risk carbon leakage and trade distortions. This study employs a Systematic Literature Review (SLR) to analyze research related to carbon taxes and the green economy. Findings show that carbon taxes are effective in reducing emissions and generating fiscal revenues. International harmonization can prevent carbon leakage, maintain trade stability, and strengthen the transition to a green economy. Global coordination is necessary through minimum price standards, reporting mechanisms, and fair compensation for developing countries.

Keywords : *carbon tax, green economy, harmonization, international policy, trade.*

JEL Codes : H23, Q01, F42

INTRODUCTION

Climate change continues to show an alarming trend of carbon emissions from burning fossil fuels and industrial activity reaching new records in recent years, with the footprint of energy emissions expected to touch close to 37–38 billion tonnes of CO₂ by 2024. This phenomenon contributes to an increase in atmospheric CO₂ concentrations, which are recorded at a level of around 422–423 ppm in 2024 a level that is scientifically related to the increasing frequency and intensity of extreme events such as heat waves, floods, and droughts. This condition underscores the urgency of shifting the direction of global economic policy towards a low-carbon development model. In policy, carbon pricing mechanisms through carbon taxes and emissions trading systems (ETS) have become the primary choice for many countries to internalize the external costs of emissions. In recent years, the number of carbon pricing instruments in operation has increased rapidly; in 2023–2024, there will be dozens of mechanisms that generate significant public revenue (more than US\$100 billion per year), most of which are directed to funding climate programs, transitional support for affected sectors, and reducing social inequalities. However, the scope of carbon prices is not yet universal: only a fraction (in the range of ~25–30%) of global emissions fall under an explicit form of price. This condition reflects progress as well as the limited effectiveness of carbon pricing policies globally. Differences in policy design between countries including tariff rates, sector coverage, revenue allocation mechanisms, and implementation phases pose serious challenges. One of the main problems is the risk of *carbon leakage*: when producers move production activities to jurisdictions with looser emission regulations so that total global emissions may not fall (or even rise). In addition, carbon price disharmony can lead to trade distortions and competitive inequality, which in turn triggers protectionist responses or border adjustment measures such as Carbon Border Adjustment Mechanisms (CBAM). Efforts such as the European Union's CBAM aim to balance the carbon price burden between domestic production and imports, while providing incentives for trading partners to adopt their own carbon pricing policies. However, this mechanism also raises debates about WTO compliance, the impact on developing countries, and the implications of the global economic distribution. In addition to trade and carbon leakage issues, challenges to implementing carbon taxes in many countries include administrative capacity to measure and verify emissions, socio-economic inequality due to rising energy prices for the poor, and the need to design pro-justice use of tax revenues (e.g., targeted subsidies, worker training programs, or green infrastructure investments). Policy design that is sensitive to distribution for example, the partial distribution of tax revenue for social compensation or tax reductions for small businesses is needed for green fiscal policies to be politically acceptable and effective in reducing emissions without exacerbating inequality. It is in this context that the idea of harmonization of

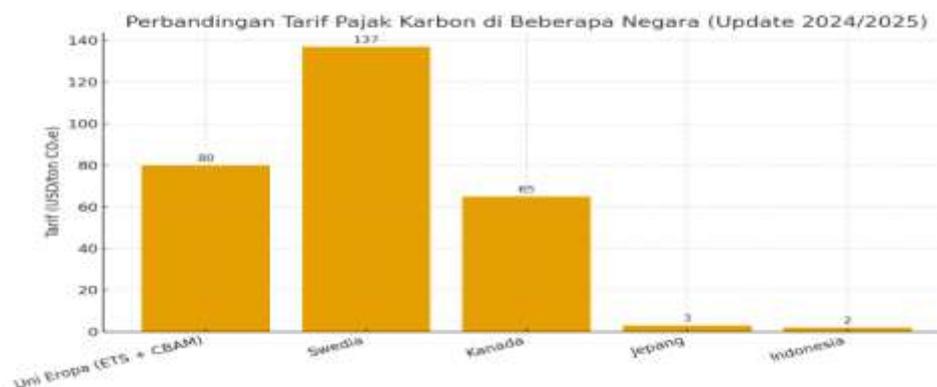
international carbon taxes becomes relevant: harmonization does not necessarily mean equal tariffs across countries, but rather a coordination framework that reduces trade distortions, minimizes the risk of carbon leakage, and increases collective effectiveness in achieving global climate targets. Harmonized approaches can be tangible through multilateral agreements (e.g. minimum carbon price standards), mutually agreed border adjustment mechanisms, or technical platforms for the interoperability of emissions trading systems. However, the path to harmonization faces political obstacles, differences in levels of development, and the need to ensure transitional justice, especially for developing countries facing fiscal and technological limitations.

Table 1. Variations in Carbon Tax Policies in Several Countries

Country/Block	Carbon Tax Rate (USD/ton CO ₂ e)	Year of Implementation	Key Sector Coverage	Note
European Union	€45–€90 (ETS)	2005	Energy, heavy industry	Combined with CBAM
Sweden	± USD 130	1991	Energy, transportation	The highest carbon tax in the world
Canada	± USD 50 (2022), up gradually	2019	Energy, transportation	Target of USD 170 by 2030
Japan	± USD 3	2012	Energy	Relatively low rates
Indonesia	± USD 2 (planned)	2022	Power plant	Still in the early stages of implementation

Source: World Bank – Carbon Pricing Dashboard (2023)

Based on Table 1 there is significant variation between countries: Sweden is very high (USD 130), Canada is rising gradually (USD 170 in 2030), while Japan and Indonesia are relatively low (< USD 5). Developed countries tend to dare to set high tariffs to encourage a rapid energy transition, while developing countries are still careful not to burden industries and society. The EU is leading the way with a combination of ETS and CBAM, which serves to not only reduce domestic emissions, but also prevent global carbon leakage. In addition to the comparison table of carbon tax policies in different countries, a clearer picture can also be obtained through the diagram below. The diagram shows the variation in the latest carbon tax rate (2024/2025), where there are quite striking differences between countries. The European Union and Sweden set relatively high tariffs that put significant fiscal pressure on emissions, while Canada is at a medium level with a consistent upward trend. In contrast, Japan and Indonesia are still in the low-tariff range, reflecting the early stages of implementation of this instrument. The visual differences in this diagram further confirm the fragmentation of global policies that need to be addressed through the harmonization of international carbon taxes.



Picture 1. Comparison Of Carbon Tax Rates in Several Countries
 Source: World Bank

The diagram above shows a comparison of carbon tax rates across several countries and economic blocs in 2024/2025. The European Union through the EU Emission Trading System (ETS) scheme strengthened by the Carbon Border Adjustment Mechanism (CBAM) has set an average carbon price of around USD 80 per ton of CO₂e, making it one of the regions with the strictest carbon price regulations. Sweden is

recorded as the country with the highest carbon tax in the world, reaching around USD 137 per ton of CO_{2e} by 2024, which is consistent since the policy was first introduced in 1991. Meanwhile, Canada implements a federal carbon tax scheme that continues to increase every year, with a rate of USD 65 per ton of CO_{2e} in 2024 and targeted to increase to USD 170 by 2030. Japan is still in the low tariff range, which is around USD 3 per ton of CO_{2e}, so its effectiveness in encouraging emission reductions is relatively limited. Indonesia itself has just started the implementation of a carbon tax in 2022 with a rate of USD 2 per ton of CO_{2e}, limited to the coal-based steam power plant (PLTU) sector, and is planned to increase gradually according to the energy transition roadmap. The significant differences in carbon tax rates and coverage above show the fragmentation of policies between countries. This has the potential to create competitive inequality, *carbon leakage*, and distortions of international trade. Therefore, this diagram strengthens the argument for the importance of harmonizing international carbon taxes as a global fiscal instrument that can support the transition to a green economy while maintaining a balance of cross-border trade. Based on the above description, it is clear that the transition to a green economy cannot be separated from the role of carbon taxes as a fiscal instrument. However, to ensure its effectiveness on a global scale, international policy harmonization is needed that is able to reduce the gap between countries while maintaining the stability of world trade. Thus, this study becomes relevant not only in an academic framework, but also in the practice of global fiscal policies that support sustainable development. The purpose of this study is to find out how the alignment of carbon tax policies between countries can accelerate the achievement of global emission reduction targets, unfair fiscal competition. Research objectives: (1) Analyze the urgency of carbon taxes as a fiscal instrument in internalizing negative externalities of carbon emissions. (2) Identify differences in carbon tax policies between countries (tariffs, mechanisms, and scope) and their impact on global trade. (3) Assess the potential benefits of harmonizing international carbon taxes, both in terms of state revenue, climate justice, and trade stability.

LITERATURE REVIEW

Carbon Tax

Taxes are mandatory contributions to the state, paid by individuals or entities, and must be carried out under the law without providing direct rewards. Taxes are used for state purposes to achieve the greatest prosperity of the people (Law of the Republic of Indonesia, 2007). Carbon tax is a type of tax imposed on carbon emissions that have a negative impact on the environment (Law of the Republic of Indonesia, 2021). The implementation of carbon taxes in Indonesia is regulated in the Environment Law. Specifically, Article 13 paragraph (5) states that the carbon tax is payable on the purchase of goods that contain carbon or activities that produce a certain amount of carbon during a certain period (Law of the Republic of Indonesia, 2021). The carbon tax rate in Indonesia is regulated in Article 13 paragraphs (8) and (9) of the Environmental Law. The tax rate is set higher than or equal to the market price of carbon in the carbon market per kilogram of carbon dioxide equivalent (CO_{2e}). If the price of carbon in the market is lower than IDR 30 per kilogram of CO_{2e}, then the carbon tax rate is set at a minimum of IDR 30 per kilogram of CO_{2e} or its equivalent unit (Law of the Republic of Indonesia, 2021). The implementation of a carbon tax has several benefits, including reducing greenhouse gas emissions from emission sources. Revenues from the carbon tax can be used to fund development, adaptation and mitigation of climate change, as well as investments in environmentally friendly projects. Carbon taxes also support low-income communities through grants, which help them (Fandira et al., t.t.). The carbon tax is one of the important fiscal instruments in driving the transition to a green economy. According to Shi-Ling Hsu (2011), a carbon tax is a tax imposed on each unit of carbon dioxide (CO₂) emissions produced, with the aim of internalizing the external costs of carbon pollution while encouraging the use of clean energy (*The Case for a Carbon Tax*, Island Press, 2011). According to the Organisation for Economic Co-operation and Development (OECD, 2013), a carbon tax is defined as a tax imposed on fossil fuels or activities that produce greenhouse gas emissions, with the aim of reducing emissions while promoting low-carbon energy (*OECD Taxation, Innovation and the Environment*, 2013). Furthermore, the World Bank (2019) emphasized that a carbon tax is a form of carbon pricing policy that sets costs for carbon emissions to reflect the social costs of climate change as well as encourage energy efficiency and investment in clean technology (*State and Trends of Carbon Pricing 2019*, World Bank, 2019).

Harmonization of International Carbon Taxes

The harmonization of international carbon taxes aims to create equality in emission costs between countries, prevent "carbon leakage" (the transfer of industries to countries with looser environmental regulations), and improve the effectiveness of global climate policies. Peter Dasgupta, Karl-Göran Maler, and Antonio Vercelli in *The Economics of Transnational Commons* (1992) argued that harmonization of carbon taxes can be achieved through multilateral agreements that regulate emission standards and global carbon trading mechanisms. Michael Hoel in his article *Harmonization of Carbon Taxes in International Climate Agreements* (1993) emphasized that the harmonisation of carbon taxes can reduce international trade distortions and improve global economic efficiency in addressing climate change.

The Role of Green Fiscal Policy in the Green Economy

Green fiscal policy includes the use of fiscal instruments such as taxes, subsidies, and state spending to support the transition to a green economy. Sevil Acar and Erinc Yeldan in *the Handbook of Green Economics* (2019) revealed that green fiscal policies can include tax incentives, environmentally friendly subsidies, and state spending directed at supporting economic growth that pays attention to environmental sustainability.

Previous research

- a. Irama, A. B. (2022), research title Carbon Tax Implementation in Indonesia: Potential State Revenue and Reduction in the Amount of Carbon Emissions, The research method used qualitatively with a content analysis and scoping review approach, with the result of potential carbon tax revenue from the energy sector of Rp 23.651 trillion by 2025; Carbon tax can reduce carbon emissions in Indonesia
- b. Adrian Harry Wibisono & Gatot Soepriyanto (2024) The Challenges of Carbon Tax as an Alternative to Clean Energy Transition Policies in Indonesia: A Case Study of the Automotive Industry, research methods used Qualitatively with case studies and interviews, results obtained Identification of challenges in the implementation of carbon tax in the Indonesian automotive industry; policy recommendations to support the clean energy transition.
- c. Nuraini Vanira (2023) The Implementation of Carbon Tax as an Effort to Control Carbon Emissions in Indonesia, Qualitative Research Methods with Case Studies, the results obtained are Evaluation of the implementation of carbon taxes in Indonesia; Analysis of its impact on carbon emission control and the green economy.
- d. Adrian, Made Putri Ariasih, Riyanto Wujarso (2025) The Impact of Carbon Tax on Industry and the Environment in Indonesia, research methods used are interdisciplinary with economic and ecological approaches, the results of the discussion show an analysis of the impact of carbon tax on industrial production costs and ecosystem balance; Identify challenges and opportunities in the implementation of carbon taxes.
- e. Harfiani (2025) Carbon Tax Implementation in Indonesia: Challenges and Implications for Social Justice, Juridical-normative research methods with literature studies, discussion results Analysis of obstacles to carbon tax implementation; implications for vulnerable groups and recommendations for fair and inclusive policies.

RESEARCH METHOD

This study uses a qualitative approach with the Systematic Literature Review (SLR) method. SLR is a research method that aims to identify, assess, and synthesize all empirical evidence relevant to predetermined research questions, using a transparent and systematic procedure. This approach was chosen because it allows researchers to obtain a comprehensive overview of the topic of international carbon tax harmonization as a fiscal instrument in the context of a green economy. According to Ghozali, SLR in the context of qualitative research is a method for collecting, selecting, and assessing scientific literature from various sources (journals, books, official reports), so that researchers can make clear, accurate, and systematic synthesis of theories and empirical findings.

Data Source

Secondary data is in the form of international journal articles, reports from global institutions (World Bank, IMF, OECD, UNFCCC), as well as regulations related to carbon taxes and green fiscal instruments. Supporting data is in the form of global emission statistics, carbon tax implementation trends, and emissions trading mechanism (ETS) implementation reports from 2005–2024.

Data Collection Techniques

- a. Data was collected through a search of scientific articles using the Scopus database, Web of Science, and Google Scholar, with the keywords *carbon tax*, *carbon pricing harmonization*, *green economy transition*, and *fiscal instrument*.
- b. Literature selection based on inclusion criteria: relevance to the topic, publication year 2010–2024, and data accessibility.
- c. Literature exclusion is carried out for articles that are non-academic opinions or do not discuss fiscal aspects and international harmonization.

Data Analysis Techniques

The analysis is carried out in stages:

- a. Identification: classify literature according to themes (green economy, carbon tax, international harmonization).
- b. Thematic coding: grouping findings into main categories: (a) the urgency of carbon taxes, (b) policy variations between countries, (c) harmonization challenges, and (d) fiscal implications.

Narrative synthesis: summarizing the results of the literature to answer the formulation of the research problem and draw conclusions.

RESULTS AND DISCUSSION

Based on the Systematic Literature Review (SLR), this study examines the literature related to carbon taxes, international fiscal harmonization, and the green economy. The sources analyzed include:

1. Peer-reviewed scientific articles from international and national journals.
2. Academic books that discuss green economics, fiscal policy, and carbon tax instruments (e.g., Hsu, 2011; Metcalf & Weisbach, 2009; Sugiono, 2020).
3. Reports from international institutions such as the OECD (2013) and the World Bank (2019).

The results of the SLR show that there is a consensus that carbon taxes are an effective fiscal instrument to drive a low-carbon economic transition and internalize the external costs of carbon emissions. However, the effectiveness of carbon taxes is greatly influenced by uniformity of implementation at the international level, which is the basis for the need for harmonization of carbon taxes.

The Urgency of Carbon Taxes in the Green Economy Transition

The results of the review show that the carbon tax is a strategic fiscal instrument in driving the transition to a green economy. By putting a price on carbon, the state can internalize negative externalities, reduce emissions, and gain state revenue. World Bank data (2023) recorded global receipts from carbon pricing instruments exceeding USD 100 billion, of which some were directed to renewable energy investments, energy efficiency, and climate adaptation programs. This proves that the carbon tax is not just an environmental instrument, but also serves as a fiscal instrument for sustainable development.

Variations in the Implementation of Carbon Taxes in Different Countries

Literature studies reveal large variations in policy design:

- a. The European Union: relying on a combination of the ETS and the CBAM mechanism to reduce carbon leakage.
- b. Sweden & Norway: set high carbon tax rates (>USD 100/ton CO₂e) that have been proven to significantly reduce emissions without harming economic growth.
- c. Southeast Asia: some countries are only in the early stages of implementation (Indonesia will start imposing a carbon tax in 2022 with an initial rate of IDR 30/kg CO₂e).

Differences in tariff design and sector coverage create potential competitive inequities and drive issues of international harmonization.

The Challenge of Harmonizing International Carbon Taxes

The results of the analysis identified several key challenges:

1. Differences in economic capacity: developing countries tend to reject high carbon tariffs for fear of reducing industrial competitiveness.

2. Risk of carbon leakage: without global coordination, emissions could potentially move to countries with loose regulations.
3. Climate justice aspect: developed countries are required to bear a greater burden according to the principle of common but differentiated responsibilities (CBDR).
4. Political and international legal challenges: the harmonization of carbon taxes must be adapted to international trade rules (WTO) and the fiscal sovereignty of each country.

Fiscal Implications of Harmonization of Carbon Taxes

Harmonization of carbon taxes has the potential to:

- a. Increasing global effectiveness in reducing emissions through cross-border coordination.
- b. Reduce trade distortions by equalizing the basis of international minimum tariffs.
- c. Expand green fiscal revenues, which can be allocated to energy transition programs, social compensation, and environmentally friendly technological innovation.
- d. Encourage geopolitical stability by creating a level playing field in the global market.

Integrative Discussion

The literature review emphasizes the need for a global framework as follows

1. A review of the literature and World Bank data (2023) shows significant differences between countries: Sweden: ± USD 130/ton, successfully driving the clean energy and transportation transition. European Union: €45–90 through ETS and CBAM, reducing carbon leakage and trade distortions. Canada: ± USD 50 (gradually rising to USD 170 by 2030), balancing fiscal compliance and industry adaptation. Japan: ± USD 3, low rates limit effectiveness. Indonesia: ± USD 2, the initial stage of implementation with the scope of power plants. This difference affects global trade because carbon leakage can occur if the industry moves to a country with low tariffs. Harmonization or regulation of mechanisms such as CBAM (Carbon Border Adjustment Mechanism) is important to maintain trade fairness and stability (Hoel, 1993; Dasgupta et al., 1992).
2. International carbon tax harmonization has a dual benefit: State revenue: Provides a stable fiscal source, enabling funding of green projects and clean energy infrastructure (Metcalf & Weisbach, 2009). Climate justice: Setting global minimum tariff standards reduces disparities between developed and developing countries and prevents carbon leakage. Trade stability: Harmonization reduces global market distortions, keeps industry competition fair, and minimizes trade conflicts (OECD, 2013). The SLR shows that countries that implement harmonization tend to invest more quickly in low-carbon technologies and integrate carbon taxes into sustainable development strategies.
3. International forums such as the OECD, G20, IMF, and UNFCCC can be a platform to build a harmonized framework for carbon taxes based on the principles:
 - a. Flexible global minimum tariff standards according to the economic capabilities of developed and developing countries.
 - b. Compensation mechanisms and technical support for developing countries to ensure equitable participation.

Integration with international carbon trading mechanisms, such as CBAM, to prevent trade distortions. Transparent monitoring and evaluation, including emissions reporting and management of carbon tax revenues

Policy Implications

- a. Short term (1–3 years): implementation of regional carbon price floor, pilot CBAM in carbon-intensive sectors, allocation of tax revenues for vulnerable households.
- b. Medium term (3–7 years): MRV capacity building, harmonization of emission reporting methodologies, coordination through regional forums (e.g. ASEAN).
- c. Long-term (>7 years): multilateral agreements that set global minimum tariff standards, cross-border compensation mechanisms, and trade dispute resolution.

Research Limitations

- a. The dominance of developed country literature, which limits the representation of developing countries' perspectives.

- b. Methodological variations between studies (qualitative, quantitative, normative) make it difficult to conduct quantitative meta-analysis.
- c. Potential *publication bias*, where studies with negative results are poorly published.

CONCLUSION AND SUGGESTION

Conclusion

Based on the results of the literature review and analysis of the Systematic Literature Review (SLR), the following can be concluded:

1. Carbon taxes have proven to be an effective fiscal instrument in reducing carbon emissions in many countries, as well as being a reliable source of government revenue that can support green development programs. These instruments provide incentives for manufacturers and consumers to switch to clean energy and low-carbon technologies.
2. Carbon tax policies vary widely between countries in terms of tariffs, sectors covered, and how taxes are collected. Developed countries usually set higher rates (such as Sweden around \$130 per tonne, and the EU between €45 to €90 per ton), while emerging countries are starting with much lower rates (such as Indonesia around \$2 per tonne). These differences can lead to problems such as carbon leakage, trade distortions, and inequities in the way countries handle taxes.
3. International tax harmonization is important to ensure equitable emission costs across countries, prevent carbon leakage, and maintain global trade stability. Harmonization does not mean the same tax rates in all countries, but it does include the establishment of minimum standards, reporting mechanisms, and technical support for developing countries.
4. The role of carbon taxes in the green economy transition Aligning carbon taxes can accelerate the transition to a green economy, encourage investment in low-carbon technologies, and ensure the integration of fiscal, environmental, and international trade policies.

Suggestion

Based on the above conclusions, some recommendations that can be given include:

1. Governments should set progressive carbon tax rates and expand sectors covered by emissions, along with a transparent system for reporting and use of revenues from carbon taxes.
2. International organizations such as the OECD, G20, IMF, and UNFCCC should help create global minimum standards for carbon taxes, provide support for developing countries, and link them to carbon trading systems such as CBAM.
3. Revenues from carbon taxes should be used to support innovation in renewable energy, low-carbon technologies, and climate adaptation programs, especially for vulnerable communities.
4. Further research is recommended on the impact of carbon tax harmonization on the economy, international trade, and emission reduction, to strengthen evidence-based policymaking.

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