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Carbon Tax in Indonesia as a Fiscal Instrument and Climate Justice: A Literature Review

Permata Brillyana Hardini[1], Haula Rosdiana[2]
[1] Master of Tax Administration and Policy, University of Indonesia, Indonesia
[2] Department of Fiscal Administrative Science, University of Indonesia, Indonesia
Email: permata.brillyana@ui.ac.id; h.rosdiana@ui.ac.id

ABSTRACT

The carbon tax is a fiscal and environmental policy instrument designed to reduce greenhouse gas (GHG) emissions through a carbon emissions pricing mechanism. This study examines carbon tax policy as both a fiscal tool and an instrument of climate justice in developing countries, focusing on Indonesia. Using a qualitative approach through literature analysis, this research assesses policy dynamics, economic-environmental co-benefits, and implementation challenges of carbon taxation in Indonesia. Findings indicate that carbon taxation significantly accelerates green economy transition by stimulating clean energy investment and augmenting fiscal revenue. However, effectiveness hinges on inclusive policy design, institutional readiness, and compensatory mechanisms for vulnerable populations. In Indonesia, under *Undang-Undang Harmonisasi Peraturan Perpajakan* (*UU HPP*) Law No. 7 of 2021, carbon tax implementation faces delays with uncertain deployment by 2025. This study underscores the necessity of integrating carbon taxation with social protection frameworks to mitigate regressive impacts and ensure equitable low-carbon energy transitions.

Keywords: carbon pricing, carbon tax, climate justice, fiscal policy, green economy

INTRODUCTION

Failure to implement urgent and substantial measures to curb the accumulation of carbon dioxide (CO_2) and other greenhouse gases will leave future generations facing a significantly hotter planet, more frequent and severe climate-related disasters, accelerated sea level rise, and irreversible damage to natural environments (Parry, 2019). This threat is no longer a distant concern; the impacts of climate change are already being felt globally, as evidenced by rising sea levels leading to the loss of coastal areas and damage to small islands, heatwaves triggering droughts and adversely affecting human health, increased rainfall intensity, and more frequent extreme weather events such as tropical storms that can cause significant economic losses (United Nations, 2021).

In 2015, 195 countries around the world demonstrated their commitment by agreeing on concrete steps to address the impacts of climate change. This consensus was reached at the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) in Paris, widely known as the Paris Agreement. The contents of this agreement include commitments by each country to design and project reductions in greenhouse gas (GHG) emissions for the post-2020 period (Moessner, 2025; Tol, R. S., 2022).

The latest report from The Global Risks Report (2024) shows that the world is very likely to exceed the 1.5°C global warming threshold between post-2020 and the mid-2030s. This indicates that the earth's average temperature continues to rise due to human activities, especially the burning of fossil fuels. According to research by Aslani, Helo,

& Naaranoja (2014), one of the main causes of environmental degradation and increased climate risk is the accumulation of greenhouse gas emissions, particularly carbon dioxide (CO_2) in the atmosphere. According to Friedlingstein et al. (2023), in 2023 there was a significant decline in the ability of terrestrial ecosystems such as forests and soils to absorb carbon. This is due to factors such as forest fires and prolonged droughts, creating a difficult-to-break cycle that will worsen global warming (Smith, P., et al., 2019). In fact, tropical forests such as the Amazon function as significant carbon sinks. According to OECD (2023), the current rate of global warming can still be slowed if carbon emissions are reduced immediately. This highlights the importance of accelerating the transition to net-zero greenhouse gas (GHG) emissions, focusing on reducing carbon dioxide (CO_2) as well as other GHGs such as methane, nitrous oxide, and fluorinated gases. Delaying this transition will prolong carbon dependence and result in greater future costs.

Recognizing this situation, many governments are beginning to understand the importance of integrating economic development goals with environmental protection. Achieving net-zero GHG emissions requires a well-designed set of mitigation policies, with carbon pricing being a cost-efficient instrument that not only helps reduce emissions but also generates revenue to facilitate the transition (OECD, 2023; Parry, 2019). As part of this effort, various energy policy instruments, including carbon taxes, will be implemented to simultaneously achieve environmental sustainability, economic efficiency, and social welfare goals.

In line with this, Guo and Huang (2022) state that the implementation of emissions pricing mechanisms is one of the most commonly used policy strategies to reduce greenhouse gas (GHG) emissions. Similarly, Haites (2018) argues that pricing emissions can serve as an effective instrument to support the adoption of mitigation options. One of the main forms of carbon pricing is the imposition of a carbon tax. In this scheme, as noted by Halat et al. (2021), companies are required to pay taxes as a penalty for the carbon emissions they produce.

The research by Magnetti, Dominion, and Gordijn (2024) reinforces this view by showing that effective and sustainable economic policies—such as carbon taxes that internalize the social costs of GHG emissions—are feasible to implement. Magnetti (2024) and Mintz-Woo (2023) further emphasize that carbon taxes act as efficient market mechanisms that encourage economic actors to reduce dependence on fossil fuels while promoting a green economy through targeted economic incentives.

However, although they play a fiscal role in increasing state revenue, carbon taxes also present challenges in terms of climate justice. As highlighted by Boyce, Ash, and Ranalli (2023), such policies can disproportionately affect low-income communities who are more vulnerable to rising energy costs. Therefore, it is crucial that the carbon tax framework includes redistributive measures or social safety nets to ensure that the transition to a low-carbon economy takes place in a fair and inclusive manner.

In Indonesia, the carbon tax policy was introduced through the Harmonization of Tax Regulations Law (UU HPP) No. 7 of 2021, with a primary focus on controlling carbon dioxide (CO_2) emissions resulting from the combustion of fossil fuels such as coal, petroleum, and natural gas. Although its implementation was planned for 2021, this policy has been delayed and rescheduled for 2025. To date, the government is still preparing supporting infrastructure, including the development of carbon market mechanisms and the synchronization of regulations and necessary roadmaps. In its implementation, the carbon tax faces various challenges such as administrative complexity and resistance from certain industrial sectors. As a developing country,

Indonesia needs to implement this policy carefully, taking into account the socio-economic conditions of its society and ensuring that its implementation can drive inclusive and equitable green economic growth.

Although carbon taxes have been widely studied in the international literature as effective policy instruments for climate change mitigation and strengthening the green economy, most studies still focus on the context of developed countries with relatively mature carbon markets and more established policy infrastructure.

The study by Haites (2018) examines the role of carbon pricing mechanisms, particularly carbon taxes, in reducing greenhouse gas (GHG) emissions and promoting a green economy. Although this research emphasizes the effectiveness of carbon taxes in developed countries, it does not explore the specific challenges faced by developing countries such as Indonesia, where socio-economic conditions and institutional readiness can affect the success of policy implementation. In addition, Haites' study does not address the issue of climate justice, especially how carbon taxes can disproportionately impact low-income communities, which is a particular concern in developing countries.

Similarly, Guo and Huang (2022) focus on emissions pricing mechanisms as effective tools for emission reduction. However, their study also does not consider the specific challenges in developing countries, where infrastructural, social, and economic factors complicate the implementation of carbon taxes. Their analysis largely assumes that carbon taxes are equally feasible in various contexts without exploring how local challenges can affect their effectiveness or fairness. Furthermore, their analysis does not integrate considerations of a just transition for vulnerable groups, which is crucial in countries with large low-income segments.

This study presents a new perspective by examining contextual challenges in developing countries, especially Indonesia, which until 2025 has not succeeded in comprehensively implementing a carbon tax despite its regulation in the UU HPP. This delay indicates the presence of structural and institutional challenges, including unprepared carbon market mechanisms, administrative complexity, resistance from high-energy-intensity industrial sectors, and limited social protection for vulnerable communities. This study highlights the need for a carbon tax policy design that is not only economical and efficient but also fair and inclusive by considering domestic socio-economic dynamics. Therefore, the approach developed in this research contributes to enriching the literature on translating global policy into local practice in the context of developing countries.

This research aims to propose a carbon tax implementation design that is not only economically efficient but also fair and inclusive, taking into account Indonesia's specific socio-economic conditions. The benefit of this research is to provide valuable insights for policymakers in developing countries on how to design and implement carbon tax policies that can mitigate climate change without exacerbating social inequality.

RESEARCH METHOD

This research employed a qualitative approach, utilizing a literature review as the primary technique for data collection and analysis. This approach enabled an in-depth examination of existing knowledge, facilitating critical reflection and synthesis of diverse perspectives related to the research topic.

The literature was sourced from reliable academic materials, including reputable scientific journals, reference books, and relevant news articles. The search process was conducted using databases available through the remote-lib.ui.ac.id service, which

provided access to the University of Indonesia Library's collection. Additional sources were accessed through official government publications and international organization reports to ensure a comprehensive understanding of the carbon tax.

The data analysis technique used in this research was thematic analysis, which involved identifying, analyzing, and reporting patterns (themes) within the collected literature. This technique allowed for the categorization and interpretation of information to uncover recurring concepts, relationships, and insights relevant to the research questions. Each selected source was carefully read and coded to identify key themes related to carbon tax implementation, challenges faced in developing countries, and strategies to overcome these challenges. The findings from the analysis were then grouped into common themes, which were synthesized to draw conclusions about the effectiveness of carbon taxes in achieving sustainable development goals.

RESULT AND DISCUSSION

Carbon Tax

According to Parry (2019), a carbon tax is a fiscal levy imposed on emissions of carbon dioxide and other greenhouse gases with the aim of internalizing the external costs of pollution that are not reflected in market prices. According to Geroes (2019), carbon taxes function as a market-based tool that sends price signals to businesses and consumers, motivating them to decrease their reliance on fossil fuels and transition to cleaner, more efficient energy sources. Kadarukmi (2023) further explains that carbon taxes offer not only environmental advantages but also boost government revenues, which can be used to finance green initiatives and enhance national energy security. In a study on the effectiveness of the policy, Baker (2022) underlines the importance of managing carbon tax revenues, where fair and transparent approaches such as direct returns to communities or clean energy subsidies can increase public acceptance of this policy.

Meanwhile, Baranzini and Weber (2023) emphasizes that the implementation of carbon taxes in developing countries often faces structural obstacles, such as low policy infrastructure readiness, resistance from energy-intensive industries, and limited social protection systems for vulnerable groups. Carbon taxes can accelerate green technology innovation by creating financial incentives for the development of renewable energy and low-carbon technologies (Goulder & Hafstead, 2018). Carbon taxes also act as climate change prevention instruments by utilizing the Pigouvian economic principle that adjusts market prices to reflect the social costs of carbon emissions (Parry, Heine, Lis, & Li, 2018). Furthermore, carbon taxes differ from cap-and-trade mechanisms because they provide certainty of a more stable and predictable carbon price, although with the risk of uncertainty in the quantity of emissions to be reduced (Aldy & Stavins, 2012).

The Purpose and Benefits of Carbon Tax

The main objective of a carbon tax is to effectively reduce greenhouse gas emissions by minimizing economic costs by internalizing the negative externalities of carbon pollution (Stern, 2021). This tax not only aims to mitigate climate change but also to increase state fiscal revenues that can be used to support energy adaptation and transition programs (Yu, Xu, Zhang, & Sun, 2022).

Furthermore, the benefits of a carbon tax are that carbon tax revenues can be used to support green infrastructure investment, clean energy subsidies, and social protection for the poor. Klenert et al. (2018) emphasized that carbon taxes provide clear price signals that motivate behavioral changes toward GHG emission reduction. In addition to fiscal

benefits, carbon taxes encourage a green economy by accelerating the transition to renewable energy, increasing energy efficiency, and supporting low-carbon technology innovation (Moessner, 2025). In the long term, carbon taxes can also improve air quality and public health and reduce social inequality through income redistribution (Fowlie, Reguant, & Ryan, 2016). In a global context, carbon taxes are an important tool for achieving the Paris Agreement targets and directing investment toward a low-carbon economy (Aldy et al., 2021).

Design and Implementation Challenges of Carbon Tax Policy

To ensure the successful design and implementation of carbon tax policies, the Partnership for Market Readiness (2017) outlines five critical steps. First, governments must define the tax base—including the sectors, emission sources, and liable entities—which significantly shapes the policy's environmental outcomes and distributional effects. Second, they must set an appropriate tax rate, balancing environmental goals, fiscal objectives, and international benchmarks, while also establishing mechanisms for gradual adjustments over time. Third, policymakers must address unintended socioeconomic impacts, particularly on low-income populations. While tax exemptions or reductions are common, they often compromise the policy's environmental integrity. An alternative and more sustainable solution involve channeling revenues into targeted subsidies for clean technologies. Fourth, the allocation of carbon tax revenues plays a central role in determining the equity and acceptability of the policy. Revenue recycling mechanisms can reduce regressive impacts by supporting low-income households or investing in social and environmental programs. Fifth, strong compliance and enforcement mechanisms are necessary, supported by effective administrative infrastructure integrated within existing tax systems.

Despite its theoretical strengths, the implementation of carbon taxation faces considerable economic, political, and social barriers, particularly in developing countries. Research by Dyarto and Setyawan (2021) and Criqui et al. (2019) underscores the influence of political resistance, underdeveloped policy infrastructure, and limited public support, which together can delay or weaken policy adoption. These challenges are further amplified when the policy disproportionately affects vulnerable populations, potentially exacerbating energy poverty and social inequality.

This highlights the importance of viewing carbon taxes not only as fiscal instruments but also as instrument of climate justice. Without careful design, carbon taxes can disproportionately impact low-income groups and marginalized regions. Although tax exemptions offer short-term relief, they often undermine environmental outcomes. Instead, integrating redistributive mechanisms, such as cash transfers, targeted energy subsidies, or support for public transportation, can mitigate regressive effects while preserving environmental effectiveness.

Analysis of Carbon Taxes as a Fiscal Instrument

As a fiscal instrument, carbon taxes have great potential to increase state revenues that can be used for public spending to support sustainable development goals (Klenert et al., 2018). Countries such as Sweden, Canada, and the UK have demonstrated that carbon taxes can be implemented without significantly reducing economic growth, with the right tariff design and fiscal balancing policies (Metcalf & Stock, 2020; Murray & Rivers, 2015). Carbon taxes can strengthen a country's fiscal framework in dealing with climate

change risks that cause long-term economic losses by providing a stable source of funding for mitigation and adaptation (Goulder & Hafstead, 2018).

In the context of developing countries such as Indonesia, the potential of carbon tax as a fiscal instrument has not been optimally utilized. Siregar (2025) showed that revenue from carbon tax can be used to strengthen the state budget without having to increase the debt burden. However, the fiscal effectiveness of this tax is highly dependent on inclusive policy design, fair redistribution mechanisms, and tax administration capacity. International organizations such as International Monetary Fund (IMF) and Organization for Economic Cooperation and Development (OECD) also support the role of carbon taxes in fiscal policy. IMF (2019) states that carbon taxes are one of the most effective and inexpensive instruments to reduce GHG emissions while generating revenues of 1–2% of GDP if implemented properly. Overall, carbon taxes have dual potential as a tool to control negative externalities and as a stable source of state revenue to fund low-carbon and sustainable development agendas.

Analysis of Carbon Tax as an Instrument of Climate Justice

Despite their economic and environmental effectiveness, carbon taxes carry a risk of being regressive, as lower-income households tend to allocate a higher share of their income to energy and goods that are impacted by rising prices (Boyce et al., 2023). Several countries have adopted this approach to ensure a just and acceptable transition for the wider community (Nemavhidi & Jegede, 2023; Klenert et al., 2018). Carbon taxes can also be used as an instrument to strengthen the rights of communities most affected by climate change and improve their access to basic resources and services, which is part of climate justice (Mintz-Woo, 2023). Dorband et al. (2022) found that although the energy sector can have a progressive impact, the food and beverage sector tends to increase the burden on low-income households.

However, using revenues from carbon taxes to subsidize clean energy and low-emission technologies can mitigate these negative impacts and increase social equity. Beiser-McGrath and Busemeyer (2024) found that households with lower incomes allocate a greater portion of their earnings to goods and services with high carbon content, which makes them more susceptible to the financial effects of a carbon tax. Thus, a carbon tax is not only a fiscal instrument but also a tool to achieve the goals of social justice and environmental sustainability simultaneously (Sovacool et al., 2019).

Carbon Tax Policy in Indonesia

Indonesia has developed a carbon exchange as a carbon credit trading mechanism that encourages efficient and measurable emission mitigation. The development of a carbon exchange mechanism to trade emission permits, emission certificates, and Emission Reduction Certificates / Sertifikat Penurunan Emisi (SPE). This carbon exchange involves various sectors, such as energy, forestry, and industry, with increased participation from the private sector and government from 2023 to mid-2025 (World Bank, 2024). This step supports the implementation of the national carbon tax policy and carbon trading mechanism, with plans to gradually expand the scope of taxation sectors. The Indonesian Carbon Exchange is expected to become a strategic instrument in efforts to mitigate climate change and strengthen Indonesia's role in the global carbon trading ecosystem.

In Indonesia, carbon tax objects include fossil fuels such as coal, diesel, and gasoline, as well as carbon dioxide (CO_2) emissions resulting from various economic

activities, including industry and transportation. The government prioritizes the implementation of carbon taxes in sectors with high emission intensity, such as the pulp and paper industry, cement, petrochemicals, and coal-based power plants. This step aims to reduce greenhouse gas emissions and support the transition to a low-carbon economy.

The imposition of carbon taxes in Indonesia is regulated in UU HPP. The government has set a carbon tax rate of IDR 30,000 for every ton of CO emissions.$_2$e, which is equivalent to around USD 2 based on an average exchange rate of IDR 15,000 per US dollar. The carbon tax scheme implemented includes two main mechanisms: "*cap and trade"* and "*cap and tax"*. In chemical *and trade*, the government sets a maximum emission limit (cap), and companies whose emissions exceed the limit are required to purchase an Emission Permit Certificate / Sertifikat Izin Emisi (SIE) from another company whose emissions are below the limit. In terms of chemical *and taxation*, if the company cannot purchase an SIE or Emission Reduction Certificate / Sertifikat Penurunan Emisi (SPE) to cover its excess emissions, then the remaining emissions that exceed the limit will be subject to a carbon tax. The SPE is proof that the company has reduced emissions that can be sold to other parties as part of the carbon trading mechanism (Fathoni, M. I., 2021).

The implementation of the carbon tax in Indonesia was initially planned to take effect on April 1, 2022, with the coal-fired power plant / Pembangkit Listrik Tenaga Uap (PLTU) sector as the first target. However, implementation was postponed to July 1, 2022 because the government needed time to perfect the technical regulations related to the carbon market mechanism and consider the global economic conditions affected by the spike in energy and food prices. In the end, the implementation of the carbon tax was canceled in July 2022, and the government planned to re-implement it in 2025, by gradually expanding the taxed sectors according to the readiness of the sector and the national economic situation. (Armylia, 2023). According to Siregar (2025), implementation was postponed for various reasons, including technical readiness, resistance from the industrial sector, and the need to improve regulations. However, to date, there has been no official update regarding the exact schedule for the implementation of the carbon tax in 2025. According to Mintz-Woo (2023) and Nemavhidi and Jegede (2023), this delay in implementation shows the major challenges in harmonizing fiscal policy with the environmental agenda, as well as the need for an inclusive approach so that the carbon tax can be implemented effectively without burdening vulnerable groups.

Carbon taxes contribute to state revenues that can be used to fund climate mitigation programs and social protection for vulnerable groups (Siregar, 2025). However, social and economic impacts remain a challenge, especially for the industrial sector and low-income communities (Boyce et al., 2023; Nemavhidi & Jegede, 2023). The main challenges include political resistance, limited data and monitoring, and technical readiness in implementing carbon taxes. Multi-stakeholder involvement and transparency in the use of carbon tax revenues are key to successful, fair, and effective implementation (World Bank, 2024). In addition, the integration of carbon tax policies with social protection programs and green energy transitions needs to be prioritized to achieve sustainable development goals (Mintz-Woo, 2023).

CONCLUSION

This literature review demonstrates that carbon taxes are effective fiscal instruments for increasing state revenues and advancing climate justice, as they support

the transition to a green economy and incentivize investment in low-carbon technologies. While carbon taxes have proven successful in reducing greenhouse gas emissions and generating funds for climate mitigation and adaptation, their effectiveness in Indonesia depends on inclusive, transparent, and socially just policy design. Given Indonesia's ongoing social and economic inequalities, carbon tax revenues should be allocated to green investment and social protection, including cross-subsidies for low-income households, to ensure a fair energy transition. Collaboration among government, the private sector, and society is essential to maximize the economic, social, and environmental benefits of carbon taxes and to prevent exacerbating inequality. Future research should explore the long-term impacts of carbon tax allocation strategies on poverty reduction and social equity in developing countries.

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