

## The Impact of Carbon Tax Implementation on Indonesia's State Budget Revenue Efforts for Sustainable Economic Growth: Revenue Potential, Challenges, and Policy Solutions

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### ABSTRACT

*The increasing need for state financing and Indonesia's commitment to reducing greenhouse gas emissions require the presence of fiscal instruments capable of supporting economic and environmental sustainability. The carbon tax is a strategic policy because it functions as an emissions control tool and a new source of revenue for the State Budget (APBN). This study aims to analyze the potential state revenue from the implementation of the carbon tax, identify challenges, and formulate optimal policy solutions. The research method used is a qualitative approach through literature study utilizing secondary data. The results show that the carbon tax has significant potential to expand the tax base and increase state revenue, particularly from the high-emission energy sector, as well as encourage changes in consumption and production behavior towards a low-carbon economy. However, the implementation of the carbon tax in Indonesia still faces challenges. The policy implications of this study emphasize the importance of strengthening public outreach, developing an integrated and transparent MRV system, and improving institutional coordination so that the carbon tax can be optimized as a sustainable fiscal and environmental instrument.*

### ABSTRAK

Meningkatnya kebutuhan pembiayaan negara serta komitmen Indonesia dalam menurunkan emisi gas rumah kaca menuntut hadirnya instrumen fiskal yang mampu mendukung keberlanjutan ekonomi dan lingkungan. Pajak karbon menjadi kebijakan strategis karena berfungsi sebagai alat pengendalian emisi sekaligus sumber penerimaan baru bagi Anggaran Pendapatan dan Belanja Negara (APBN). Penelitian ini bertujuan untuk menganalisis potensi penerimaan negara dari implementasi pajak karbon, mengidentifikasi tantangan serta merumuskan solusi kebijakan yang dapat optimal. Hasil penelitian menunjukkan bahwa pajak karbon memiliki potensi signifikan dalam memperluas basis pajak dan meningkatkan penerimaan negara, khususnya dari sektor energi beremisi tinggi, serta mendorong perubahan perilaku konsumsi dan produksi menuju ekonomi rendah karbon. Namun demikian, implementasi pajak karbon di Indonesia masih menghadapi tantangan. Implikasi kebijakan dari penelitian ini menekankan pentingnya penguatan sosialisasi publik, pengembangan sistem MRV yang terintegrasi dan transparan, serta peningkatan koordinasi kelembagaan agar pajak karbon dapat dioptimalkan sebagai instrumen fiskal dan lingkungan yang berkelanjutan.

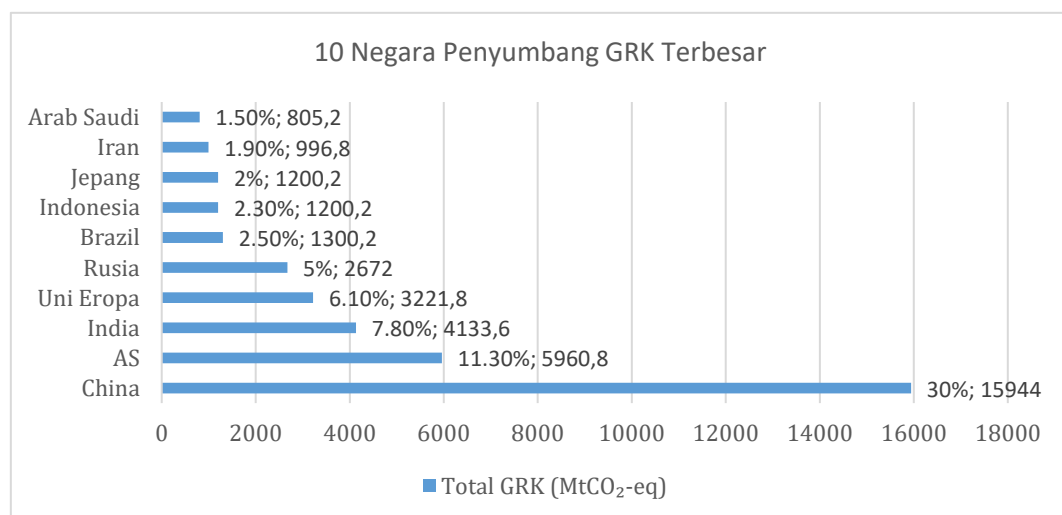
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## A. INTRODUCTION

In recent years, Indonesia's State Budget (APBN) has faced increasingly complex and dynamic global challenges. The country's financing needs have increased rapidly in

line with the national development agenda, demands for accelerated energy transformation, post-pandemic economic recovery, energy subsidy financing, and increased social spending needs. Every year, the APBN faces classic challenges due to the fact that state revenue growth is not always proportional to the rate of increase in state spending (Supriyanto, 2025). This imbalance puts significant pressure on the APBN and forces the government to seek alternative financing and new sources of sustainable revenue.

It is in this context that carbon tax emerges as a strategic fiscal instrument. Carbon tax is not only designed to reduce greenhouse gas emissions, but also has the potential to become an additional source of revenue for the country. According to the Joint Research Centre (JRC), Indonesia is one of the ten largest carbon emitters in the world, with total emissions reaching 1200.2 MtCO<sub>2</sub>-eq (Megatons of Carbon Dioxide Equivalent or around 2.3% of total global GHG emissions (Yonatan, 2025). Therefore, as a manifestation of its commitment to addressing this issue, the Indonesian government has set a target of Net Zero Emissions (NZE) by 2050. Net Zero Emissions or 'net zero emissions' in 2050 is a normative scenario that describes the path for the global energy sector to achieve net zero carbon dioxide (CO<sub>2</sub>) emissions by 2050, where developed economies are projected to achieve net zero earlier than other countries (International Energy Agency (IEA), 2023).



**Figure 1. Data on the 10 Countries Contributing the Most to GHG Emissions**

Source: Joint Research Centre (JRC)

Figure 1 show as part of its long-term fiscal strategy, the government has regulated carbon tax through Law No. 7 of 2021 on Taxation Harmonization. This policy stipulates that carbon tax is imposed on activities that produce emissions or goods that contain carbon. Steam power plants (PLTU) are encouraged to use environmentally friendly technology, as the government has set the carbon tax at IDR 30 per kilogram of carbon dioxide equivalent (CO<sub>2</sub>e), a figure that can significantly strengthen the state budget, particularly in financing energy transition and emission reduction efforts. The government targets Indonesia to reduce greenhouse gas emissions by around 29 percent on its own or 41 percent with international support by 2030. Meanwhile, the target is zero percent carbon emissions by 2060 (Novelino, 2021).

This emissions profile shows that there is a large tax base in high-emission sectors such as energy, transportation, industry, and agriculture. If managed with the right mechanisms, carbon taxes can be an effective instrument for expanding the tax base while increasing state revenue. With instruments such as carbon taxes, the government has a new source of revenue that is not only short-term but also relevant to the global and national agenda towards a low-carbon economy.

This statement is supported by findings (Pratama et al., 2022) which state that imposing taxes on transactions involving carbon-containing goods and carbon-emitting activities has great potential to increase state revenue. Implementing a carbon tax will increase state revenue through the expansion of the tax base. Similarly, the results of a study (Selvi et al., 2020) entitled "The Urgency of Implementing Carbon Tax in Indonesia" emphasize the importance and urgency of implementing carbon tax in Indonesia, given that the deteriorating environmental conditions risk reducing the quality of public health. Indonesia's target for emission reduction as part of its international participation can be realized through a carbon tax policy. The implementation of a carbon tax policy has the potential to encourage a transition from dependence on fossil fuels to the use of more environmentally friendly renewable energy sources.

However, the implementation of a carbon tax is not without challenges. The government has postponed the initial implementation of the carbon tax until 2025 (Setiawan, 2022), reflecting that there are technical, economic, and regulatory obstacles that must be resolved. Several industrial sectors are still concerned about the impact of additional costs on their competitiveness, while from a regulatory perspective, the readiness of the emission measurement and reporting system still needs to be strengthened. These challenges need to be examined in depth so that carbon taxes can contribute optimally to state revenue and support national fiscal stability.

Based on the background of the issues described above, the research questions in this study are as follows: (1) How much potential revenue can the government generate from the implementation of a carbon tax to support the sustainability of Indonesia's state budget?; (2) What are the challenges faced by the government in implementing carbon tax policies in Indonesia?; (3) What strategic policy solutions can be formulated to optimize the implementation of carbon taxes in order to increase state revenue while supporting the transition to a low-carbon economy?.

## **B. LITERATURE REVIEW**

### **Carbon Tax**

Carbon tax falls under the category of Pigovian tax. Pigovian tax is a type of tax imposed per unit of product from polluting sources, with rates adjusted to the marginal damage caused, thereby helping to create more efficient output. The idea of Pigovian taxes was first proposed by Arthur C. Pigou in 1920. There is a strong relationship between this tax and carbon tax. Carbon tax is imposed on materials containing carbon that produce carbon emissions, which is a form of negative externality.

The benefits of carbon tax are not limited to reducing greenhouse gas emissions, but also have the potential to improve the country's economy and public welfare. Carbon tax can be an additional source of revenue for the government. The proceeds from carbon tax can be allocated to provide incentives or support in various sectors, such as education, health, public transportation, or environmentally friendly industries (Kumala et al., 2021).

## **Fiscal policy**

Fiscal policy is the government's main tool for regulating state revenue and expenditure through the State Budget (APBN) in order to achieve economic development goals, macroeconomic stability, fair income distribution, and social welfare. Over time, fiscal policy has evolved not only as a tool for stabilizing the economy (countercyclical policy), but also as an instrument for structural transformation, including accelerating sustainable development. The idea of green fiscal policy emphasizes the importance of combining economic, social, and environmental objectives in fiscal policy through taxation, government spending, and green financing. Progressive taxes and environmental taxes, including carbon taxes, are seen as fiscal tools to address negative impacts and support the transition to a low-carbon economy. Thus, green fiscal policy not only serves as an economic management tool but also as a means to achieve social justice and environmental sustainability in the long term (Putra et al., 2025).

## **Green Tax**

A green tax is a type of tax imposed on activities that generate carbon emissions. Carbon emissions have an impact on climate change and the greenhouse effect. The greenhouse effect occurs due to rising air temperatures caused by increased CO<sub>2</sub> concentrations and the use of fossil fuels such as coal, petroleum, and gas. The purpose of the Green Tax is to reduce environmental damage and pollution and to reduce resource shortages for current and future generations (Wulandari, 2017).

Provisions regarding the Green Tax in Indonesia are contained in Government Regulation No. 46 of 2017, which discusses economic instruments for environmental preservation. Funding sources for the environment in Indonesia are divided into three categories, namely the Environmental Restoration Guarantee Fund (DJPLH), the Environmental Pollution and Damage Recovery Fund (DP2KPLH), and the Trust Fund or Conservation Assistance, which comes from the state budget, regional budgets, grants, and taxes and levies related to the environment (Dwi Candra & Hana Sajidah, 2022).

## **Carbon tax in Indonesia**

The implementation of carbon tax in Indonesia serves as an important policy tool in addressing climate change issues and facilitating the transition to a more environmentally friendly economy. Through Law No. 7 of 2021 on Taxation Harmonization, the government has established a legal framework for the gradual implementation of carbon tax, starting with the coal-fired power generation sector. This policy was created to incorporate the costs incurred by greenhouse gas emissions, change the behavior of economic actors, and support the achievement of national emission reduction targets in accordance with the Nationally Determined Contribution and Net Zero Emission commitments by 2060 (Nugroho & Aziz, 2024).

However, various studies indicate that the implementation of carbon tax in Indonesia still faces limitations in terms of effectiveness and transparency. Research by (Herlucky & Laudia, 2024) found that the majority of respondents rated the effectiveness and transparency of the carbon tax as moderate, with a moderate economic impact on the industrial sector. These findings indicate a dilemma between achieving environmental goals and economic resilience, particularly in relation to operational costs and industrial competitiveness. Therefore, the success of carbon taxation is highly dependent on strengthening implementation mechanisms, increasing transparency, and

providing incentives for affected sectors so that the policy can be socially accepted and economically sustainable.

### **C. RESEARCH METHOD**

The method applied in this study is a qualitative approach through literature review. The data used includes secondary data, such as government documents, news, journals, and various reliable sources, which will then produce results in the form of compiled data (data that has been selected, collected, or summarized) to produce non-numerical (qualitative) data. Furthermore, the data was analyzed qualitatively through a process of identification, grouping, and comparison of findings from various sources to reach comprehensive conclusions.

### **D. RESULT AND DISCUSSION**

#### **The Concept of Carbon Tax**

With the enactment of Law No. 7 of 2021 concerning Harmonization of Tax Regulations (HPP Law), Indonesia has become one of the countries that officially adopted a carbon tax policy. Levies on greenhouse gas emissions released into the atmosphere are known as “carbon taxes.” A carbon tax is a tax imposed on the use of carbon-based fuels, such as petroleum products, natural gas, and coal. A carbon tax is a tax imposed on carbon dioxide emissions from the combustion of fossil fuels (Salim & Sidiq, 2022).

The carbon tax is one of the instruments of carbon economic value (NEK). The imposition of a carbon tax has various benefits (Indonesian Ministry of Finance, 2021):

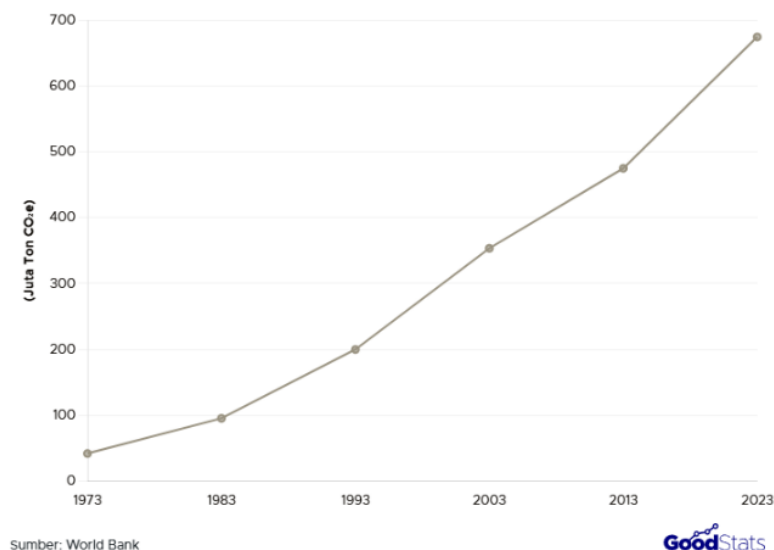
1. Reduction of greenhouse gas emissions from emission sources
2. Carbon tax revenue can be used for::
  - a. Increasing development funds
  - b. Climate change adaptation and mitigation
  - c. Environmentally friendly investments, and
  - d. Support for low-income communities in the form of social assistance

#### **Implementation of Carbon Tax on the 2025 State Budget (APBN)**

On September 26, 2023, the Indonesia Stock Exchange launched the Indonesia Carbon Exchange (IDX Carbon). With a trading volume of 908 thousand tons of carbon dioxide equivalent (CO<sub>2</sub>e), IDX Carbon has recorded a trading transaction value of IDR 50 trillion since its launch until the end of 2024. CO<sub>2</sub>e per kilogram is currently priced at an average of IDR 55,000/kg.

Carbon exchanges play an important role in the future carbon taxation system, particularly in Indonesia, where carbon tax rates are variable and aligned with carbon market prices. The lowest carbon tax rate in Indonesia is set at IDR 30 per kilogram of CO<sub>2</sub>e, and will be adjusted to match or exceed the current market price. With increasing demand in the future as more businesses are required to participate in the carbon market, the price of carbon securities will also rise, and carbon tax rates will follow suit. (Muzakki, 2025).

Carbon emissions from the energy sector during the period 2010 to 2019 showed a consistent upward trend, with an average annual growth of 3.57%. Peak emissions were recorded in 2019, with a total of 638,808 gigagrams of carbon dioxide equivalent (Gg CO<sub>2</sub>e) (Pratama et al., 2022). Details of carbon emissions generated from the energy sector are shown in the following table 1 and figure 2:



**Figure 2. Development of CO<sub>2</sub> Emissions in Indonesia Over the Last Five Decades**

Source: (World Bank, 2023)

In calculating the potential state revenue from the implementation of carbon taxation in the energy sector, an approach was used that linked the dependent variable, namely estimated tax revenue, to independent variables, namely energy sector carbon emission data and a minimum carbon tax rate of IDR 30 per kilogram of CO<sub>2</sub>e, as stipulated in the Taxation Harmonization Law (HPP Law). This tax revenue potential projection is carried out for the period 2019 to 2025 by applying the exponential smoothing method, which is a forecasting technique that utilizes a limited amount of historical data. (Heizer et al., 2017).

**Tabel 1. Carbon Tax Revenue Potential from Energy Sector 2019 – 2025**

No	Tahun	Jumlah Emisi Karbon (Gg Co <sub>2</sub> e)	Tarif Pajak Karbon Minimal (Rp/kg Co <sub>2</sub> e)	Potensi Penerimaan (Rp juta)
1	2019	638.808	30	19.164.240
2	2020	661.603*	30	19.848.088
3	2021	685.211*	30	20.556.338
4	2022	709.622*	30	21.289.861
5	2023	734.985*	30	22.049.559
6	2024	761.212*	30	22.836.366
7	2025	788.375*	30	23.651.249

Source: (Pratama et al., 2022)

Based on projections, the potential revenue that the country will earn from the implementation of carbon tax is estimated to reach IDR 23.651 trillion in 2025. Although this figure is relatively low compared to the potential revenue of other countries, these funds still have strategic value and can be utilized optimally. Among other things, they can be used as a source of financing for sectors that support the transition to a low-emission environment, as investment capital for green economic development, and as a fiscal instrument that strengthens sustainable development policies (Pratama et al., 2022).

Furthermore, the imposition of a carbon tax on fuels that contain or produce carbon emissions also has an indirect impact on people's consumption behavior. In particular, the younger generation has the potential to become more aware of the environmental



impact of their activities, thereby encouraging them to shift their consumption preferences towards products with low carbon emissions. This policy can ultimately drive structural changes in consumption and production patterns and strengthen individual participation in supporting the transformation towards a low-emission economy.

From the perspective of state revenue, the implementation of a carbon tax for the government does not cause significant turmoil when compared to the policy of adjusting the Value Added Tax rate, so that the social costs that must be borne by the government tend to be lower. Nevertheless, the government still needs to carefully assess the further impact of this policy, particularly the potential increase in energy prices that will ultimately be felt by end consumers (Muzakki, 2025). Apart from being a source of revenue, carbon tax is not solely intended to increase state revenue. This instrument is also expected to encourage changes in public behavior in reducing greenhouse gas emissions, as well as being a means to accelerate the transition to the use of more environmentally friendly technologies.

### **The Challenges of Implementing Carbon Tax in Indonesia**

The implementation of carbon tax in Indonesia is a strategic step in integrating fiscal policy with the agenda of sustainable development and climate change control. However, the application of this fiscal instrument is not without challenges. These challenges include:

#### ***Industrial and Political Resistance***

According to Gunningham in (Sinaga et al., 2025), the implementation of carbon tax faces strong resistance from large industrial sectors, especially energy and manufacturing, which are still heavily dependent on fossil fuels. These companies view carbon tax as an additional cost burden that could harm their competitiveness in domestic and global markets. This creates tension between the goal of reducing carbon emissions and protecting economic interests, especially in developing countries such as Indonesia.

Politically, the implementation of carbon taxes and carbon trading is also influenced by domestic political factors, where policies to reduce carbon emissions are often hampered by strong political interests, with large companies that depend on fossil fuels playing an important role in the policy-making process. Therefore, the successful implementation of carbon taxes must be able to navigate these economic and political interests, finding a middle ground between economic sustainability and environmental protection (Sinaga et al., 2025).

#### ***Public resistance and lack of understanding***

The lack of socialization is a major obstacle to the implementation of carbon taxes. Even though the regulations have been passed, public and industry understanding of the concept and its implications remains low (Susanto & Ulpa, 2023). Many parties only see carbon taxes as an additional burden, without understanding their important role in reducing greenhouse gas (GHG) emissions and encouraging the transition to a green economy. The lack of literacy and information received by the public regarding the impacts of climate change and the urgency of controlling GHG emissions has caused this policy to be widely rejected by the public and the business community (Harfiani, 2025). This rejection is also due to the public's lack of trust in the government's ability to manage revenue from carbon taxes.

### ***Infrastructure limitations***

The implementation of carbon tax in Indonesia is greatly hampered by technical infrastructure constraints, particularly the absence of an adequate Monitoring, Reporting, and Verification (MRV) system. The MRV system, which is used to accurately measure and track carbon emissions, is still in the development phase and has not been integrated nationally across various industrial sectors. This situation is exacerbated by the fact that many business entities, especially small and medium-sized ones, lack the capacity and tools to measure emissions from their operations. The resulting data gap has a direct impact on the difficulty of establishing a fair and transparent carbon tax base. If a robust MRV is not implemented immediately, the risk of non-compliance and unfair distribution of the tax burden will increase, which could ultimately undermine public confidence in this policy (Purnama et al., 2025).

### ***Lack of cross-sector institutional coordination***

The implementation of the carbon tax policy is further complicated by suboptimal cross-sector institutional coordination. The absence of an integrated coordination system between key institutions such as the Ministry of Finance (fiscal authority), the Ministry of Environment and Forestry (emissions data manager), the Financial Services Authority (reporting supervisor), and business actors has resulted in the partial and unintegrated implementation of policies. This situation directly hinders the formation of a cohesive and mutually supportive environmental fiscal ecosystem. (Fath & Putri, 2023; Gymnastiar, 2024 cited in (Firmansyah & Irawan, 2025) ))

### ***Solutions to Challenges in Implementing Carbon Tax in Indonesia***

To address these challenges, there are several solutions that can be offered to improve carbon tax implementation in Indonesia:

#### ***Combine carbon tax policies with various other climate control policy instruments***

Experiences from different countries show that combining carbon taxes with other policies is essential to reduce emissions. A study conducted by Haites (2018) in (Tjoanto & Tambunan, 2022) highlights that implementing multiple policies can increase compliance costs and create complex policy interactions. Therefore, it is important to link carbon taxes with other instruments, such as feed-in tariff policies or investment policies in renewable energy development for electricity, as well as public investment policies in mass transportation aimed at reducing fuel demand for private vehicles.

#### ***Public Awareness and Education***

The government needs to conduct massive awareness campaigns to increase public and business understanding of the environmental and economic benefits of carbon taxes. Given that public participation has a significant impact on climate change, social media can be used as an effective means of socialization. Understanding the objectives of carbon tax and the role of the community is expected to encourage more sustainable lifestyle changes and minimize resistance.

#### ***Strengthening the Monitoring, Reporting, and Verification (MRV) System***

The government needs to develop a reliable and transparent MRV system, which is essential to ensure accurate emissions reporting. This includes digitizing the emissions reporting system and integrating cross-sector databases, which can improve accuracy



and transparency in determining the carbon tax base. With a robust MRV system, the risk of non-compliance can be reduced and the legitimacy of the carbon tax policy can be strengthened.

### ***Improving Renewable Energy Infrastructure and Technology***

To reduce dependence on fossil fuels, the government needs to accelerate the transition to renewable energy through fiscal incentives, subsidies, or investment facilities in the clean energy sector. In addition, investment in renewable energy infrastructure must be increased so that the transition from fossil fuels to clean energy can be effective and sustainable.

### ***Strengthening Cross-Sector Institutional Coordination***

There is a need to establish an integrated coordination mechanism between agencies involved in carbon tax policy. This can be done by forming a national task force or lead institution with coordinating authority that can ensure the synchronization of fiscal, environmental, and financial sector policies. Strong coordination will also increase the effectiveness of implementation and minimize regulatory overlap.

## **E. CONCLUSION**

The implementation of carbon tax in Indonesia, as stipulated in Law Number 7 of 2021 concerning Harmonization of Tax Regulations, shows strategic potential in supporting the sustainability of state budget revenue as well as the transition to a low-carbon economy. The existence of the Indonesia Carbon Exchange (IDX Carbon) strengthens the national carbon market mechanism and opens up opportunities to adjust carbon tax rates in line with market prices. As demand from mandatory business actors increases, the price of securities and carbon tax rates are projected to rise, which can be used to finance energy transition, green economy development, and strengthen sustainable development policies. In addition to its fiscal impact, carbon tax also plays a role in encouraging changes in consumption and production behavior towards a more environmentally friendly direction. From the perspective of state revenue, the implementation of carbon tax for the government does not cause significant turmoil when compared to the policy of adjusting the Value Added Tax (VAT) rate, although the government needs to assess the potential increase in energy prices for end consumers.

However, the effective implementation of carbon tax still faces various challenges, such as industrial and political resistance, low public awareness, limited technical infrastructure, especially the Monitoring, Reporting, and Verification (MRV) system, and weak cross-sector institutional coordination. Therefore, optimizing carbon tax requires strengthening public awareness and education, developing a transparent and integrated MRV system, increasing investment in renewable energy, and strengthening institutional coordination. With a comprehensive and sustainable policy approach, carbon taxes can be optimized not only as a source of state revenue, but also as an instrument of structural transformation towards equitable and sustainable economic development in Indonesia.

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