

# The Legality and Challenges of Carbon Trading Implementation in Indonesia within the Framework of Presidential Regulation Number 98 of 2021

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## ABSTRACT

This study analyzes the legality and challenges of implementing carbon trading in Indonesia under Presidential Regulation No. 98 of 2021 using a normative legal approach. The regulation establishes the legal foundation for Carbon Economic Value (Nilai Ekonomi Karbon/NEK) instruments, including carbon trading, as part of Indonesia's commitment to achieving its emission reduction targets under the Paris Agreement. Through a statutory and conceptual analysis, this research evaluates the coherence, clarity, and enforceability of the regulatory framework governing carbon trading mechanisms. The findings indicate that, normatively, carbon trading in Indonesia has a valid legal basis and reflects a progressive shift toward market-based environmental governance. However, several challenges hinder its effective implementation. These include regulatory fragmentation across sectors, overlapping institutional authorities, limited clarity in implementing regulations, and the underdevelopment of monitoring, reporting, and verification (MRV) systems. In addition, issues related to market readiness, stakeholder capacity, and alignment with international carbon trading standards further complicate the operationalization of the system. This study concludes that while the legal framework for carbon trading has been formally established, its practical effectiveness depends on further regulatory refinement, institutional strengthening, and improved coordination mechanisms. Strengthening legal certainty and enhancing implementation capacity are essential to ensure that carbon trading can function as an effective instrument for climate change mitigation in Indonesia.

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## 1. INTRODUCTION

Climate change has emerged as one of the most pressing global challenges, demanding coordinated legal, economic, and

institutional responses from both developed and developing countries. The increasing concentration of greenhouse gas (GHG) emissions has intensified global warming, leading to severe environmental, social, and

economic consequences [1]. In response, the international community has developed various frameworks, most notably the Paris Agreement, which requires participating countries to commit to emission reduction targets through Nationally Determined Contributions (NDCs). As a signatory, Indonesia has pledged to reduce its GHG emissions by 31.89% independently and up to 43.20% with international support by 2030 [2]. Achieving these targets necessitates the adoption of innovative policy instruments, including market-based mechanisms such as carbon trading.

Carbon trading mechanisms represent a strategic approach to addressing climate change by aligning economic incentives with environmental objectives. As a market-based system, carbon trading allows companies to buy and sell emission permits, thereby enabling cost-effective reductions in greenhouse gas emissions [3]. In Indonesia, the regulatory foundation for this system is supported by policies such as Presidential Regulation Number 98 of 2021, which establishes the legal basis for carbon trading implementation, although challenges related to compliance and transparency remain [3]. Furthermore, Indonesia's commitment under the Paris Agreement reinforces the urgency of strengthening these mechanisms to meet national emission reduction targets.

Carbon trading, often referred to as emissions trading, has been widely implemented in various jurisdictions, including the European Union Emissions Trading System (EU ETS), one of the most developed carbon markets globally. For Indonesia, the adoption of this mechanism reflects a shift toward integrating environmental goals with economic competitiveness. However, several challenges persist, including regulatory gaps, overlapping institutional authority, and weak enforcement, which hinder the effectiveness of carbon trading [4]. Strengthening monitoring and verification systems, enhancing institutional capacity, and encouraging private sector participation are therefore essential to ensure the successful implementation of carbon trading in

Indonesia [4], [5]. Ultimately, the effectiveness of carbon trading depends heavily on the robustness and consistency of the legal framework governing its implementation.

In this context, the Indonesian government enacted Presidential Regulation No. 98 of 2021 concerning the Implementation of Carbon Economic Value (Nilai Ekonomi Karbon/NEK) to support the achievement of Nationally Determined Contribution targets and control greenhouse gas emissions in national development. This regulation represents a significant milestone in Indonesia's environmental governance, as it formally introduces carbon pricing instruments, including carbon trading, carbon taxes, and result-based payments, while also outlining key mechanisms such as emission caps, offset schemes, and the establishment of a national registry system. From a legal perspective, this regulation provides the foundational basis for operationalizing carbon trading within Indonesia's jurisdiction [6]. However, its implementation faces substantial challenges, particularly in terms of regulatory coherence, where unclear stakeholder roles may lead to overlaps across sectors such as energy, forestry, and finance [7], as well as broader gaps in regulatory frameworks that can hinder effective carbon market operations [4].

Furthermore, institutional readiness and transparency remain critical concerns in ensuring the effectiveness of carbon trading in Indonesia. Limited technical capacity, along with inadequate monitoring, reporting, and verification (MRV) systems, constrains the development of a robust carbon market [8], while the need for stronger public-private partnerships and community participation is increasingly emphasized [8]. At the same time, issues related to the transparency and credibility of carbon credits persist, particularly regarding their potential impact on marginalized communities, highlighting the importance of equitable benefit distribution and enhanced public participation [4]. These challenges reflect a broader gap between normative legal provisions and their practical implementation, further compounded by the

need to align Indonesia's carbon trading system with international standards and cross-border carbon markets without compromising national interests.

From a normative legal perspective, it is essential to assess whether the existing regulatory framework adequately addresses the principles of legal certainty, justice, and efficiency. Normative legal analysis allows for a critical examination of statutory provisions, legal doctrines, and regulatory structures to determine whether they are sufficient to support the intended policy objectives. In the case of carbon trading in Indonesia, such analysis is necessary to identify legal gaps, inconsistencies, and areas requiring further regulatory refinement.

Based on the above background, this study aims to analyze the legality of carbon trading under Presidential Regulation No. 98 of 2021 and to identify the key challenges in its implementation. Specifically, the study seeks to answer the following questions: (1) How is the legality of carbon trading structured within the framework of Presidential Regulation No. 98 of 2021? and (2) What are the main legal and institutional challenges affecting its implementation in Indonesia? By addressing these questions, this research is expected to contribute to the development of environmental law and policy in Indonesia, particularly in strengthening the legal foundation for carbon trading as a strategic instrument for climate change mitigation.

## 2. METHODS

This study employs a normative legal research method, which focuses on the analysis of legal norms, principles, and doctrines governing carbon trading in Indonesia. The primary object of analysis is Presidential Regulation No. 98 of 2021, which serves as the central legal framework for the implementation of Carbon Economic Value (Nilai Ekonomi Karbon/NEK). Normative legal research is appropriate for this study because it allows for a systematic examination of statutory regulations, legal consistency, and the extent to which existing legal

provisions provide clarity, certainty, and enforceability in regulating carbon trading mechanisms.

The approach used in this research includes a statutory approach and a conceptual approach. The statutory approach is conducted by reviewing and analyzing relevant legislation, including laws, government regulations, and presidential regulations related to environmental protection, climate change mitigation, and carbon pricing instruments. In addition, the conceptual approach is applied to examine legal doctrines and principles such as legal certainty, regulatory coherence, and environmental justice, which are essential in evaluating the adequacy of the carbon trading framework. Secondary legal materials, including academic literature, journal articles, policy reports, and international agreements such as the Paris Agreement, are also utilized to provide a broader analytical perspective.

Data collection is carried out through a literature study, while data analysis is conducted using qualitative legal analysis techniques. This involves interpreting legal texts, comparing regulatory provisions, and identifying gaps or inconsistencies within the legal framework. The analysis is descriptive-analytical in nature, aiming not only to describe the existing regulatory structure but also to critically assess its effectiveness in supporting the implementation of carbon trading in Indonesia. Through this method, the study seeks to generate normative arguments and recommendations for improving the legal and institutional framework of carbon trading policies.

## 3. RESULTS AND DISCUSSION

### 3.1 Legal Framework of Carbon Trading in Indonesia

The enactment of Presidential Regulation No. 98 of 2021 marks a pivotal development in Indonesia's environmental legal system, particularly in institutionalizing carbon trading within the broader Carbon Economic Value (Nilai Ekonomi Karbon/NEK) framework. This regulation provides a formal legal basis for

implementing market-based mechanisms aimed at reducing greenhouse gas emissions, including emissions trading, carbon offsetting, and result-based payments. From a normative perspective, the regulation reflects Indonesia's commitment to fulfilling its obligations under the Paris Agreement by integrating economic instruments into environmental governance [9], [10].

The legal structure introduced by Presidential Regulation No. 98 of 2021 encompasses several key components. It establishes emission caps for certain sectors as a basis for allocating emission allowances, introduces a national carbon registry system to track emissions, credits, and transactions in order to ensure transparency and accountability, and recognizes both compliance and voluntary carbon markets, allowing flexibility for different actors to participate. These elements collectively demonstrate that Indonesia has adopted a hybrid regulatory approach that combines traditional command-and-control mechanisms with market-based instruments, enabling more adaptive and efficient climate policy implementation.

However, several challenges and gaps remain in its implementation. Issues of equitable distribution of benefits from carbon trading persist, particularly for marginalized communities [11], while regulatory clarity is still limited, as many technical aspects and stakeholder roles require further elaboration [7]. In addition, the absence of detailed enforcement mechanisms, including robust monitoring and verification systems, raises concerns regarding compliance and effectiveness [4]. From a doctrinal perspective, the regulation still functions as a framework law that requires further implementing regulations, as the lack of detailed technical provisions—such as allowance allocation procedures, trading systems, dispute resolution, and sanctions continues to constrain the practical enforceability of carbon trading in Indonesia.

### 3.2 Legality and Normative Evaluation

From a normative legal perspective, the legality of carbon trading under Presidential Regulation No. 98 of 2021 can be assessed through the principles of legal certainty, justice, and efficiency. In terms of legal certainty, the regulation provides a foundational legal recognition of carbon trading as a legitimate economic activity by clearly defining key concepts such as carbon units, emission reductions, and carbon economic value, which are essential for establishing a functional market. However, legal certainty is not fully achieved due to overlapping authorities among ministries responsible for environment, energy, forestry, and finance, which create potential regulatory conflicts and weak coordination [7]. Furthermore, the regulation still leaves many technical and operational aspects undefined, particularly regarding stakeholder roles in carbon economic valuation, thereby increasing the risk of inconsistent policy implementation [7].

From the perspective of justice, carbon trading raises significant concerns regarding the equitable distribution of benefits and burdens. While market mechanisms can incentivize emission reductions, they may also disproportionately disadvantage smaller businesses and vulnerable communities that lack the capacity to participate effectively in carbon markets [11]. The regulation does not comprehensively provide safeguards to protect marginalized groups, which may lead to unequal access to carbon trading opportunities and reinforce existing socio-economic disparities [11]. These concerns highlight the importance of embedding social equity considerations within environmental economic policies.

From an efficiency standpoint, carbon trading is theoretically recognized as a cost-effective mechanism for reducing emissions; however, its practical implementation in Indonesia remains constrained. Limitations in institutional capacity, insufficient monitoring systems, and issues related to data reliability reduce the effectiveness of the carbon market [12]. In addition, stronger regulatory oversight and more robust governance

mechanisms are required to ensure market functionality and credibility [3]. Without these supporting elements, the potential efficiency gains of carbon trading may not be fully realized in practice.

### 3.3 Institutional and Operational Challenges

One of the most significant challenges in implementing carbon trading in Indonesia lies in institutional readiness. Effective carbon markets require robust institutions capable of managing emissions data, verifying carbon credits, and enforcing compliance. Although Presidential Regulation No. 98 of 2021 outlines the establishment of a national registry system, its operationalization remains a work in progress, with persistent issues related to data accuracy, transparency, and cross-sector integration. In addition, regulatory gaps and inconsistencies continue to affect the coherence of carbon market operations, while variations in technical capacity across sectors contribute to uneven implementation [4], [8]. The need for stronger community participation is also critical to prevent social inequities and potential conflicts, particularly in areas related to land use and resource governance [8].

Another critical challenge concerns the development of a credible monitoring, reporting, and verification (MRV) system. The effectiveness and integrity of carbon trading depend heavily on accurate emissions data and the credibility of carbon credits. However, in Indonesia, inconsistent MRV practices and limited standardization undermine data reliability and market trust [4], [12], [13]. The absence of standardized methodologies and independent verification mechanisms further complicates efforts to ensure transparency and accountability, thereby increasing the risk of market inefficiencies and reduced environmental effectiveness [12].

Furthermore, market readiness among stakeholders remains limited, particularly among small and medium enterprises that often lack sufficient understanding of carbon trading mechanisms and regulatory requirements. This low level

of awareness reduces participation and constrains the overall effectiveness of the carbon market. In addition, the absence of a fully developed trading infrastructure including digital platforms, financial instruments, and supporting market institutions poses significant barriers to efficient transactions and market expansion, ultimately limiting the potential impact of carbon trading as a tool for emissions reduction.

### 3.4 Alignment with International Carbon Markets

The integration of Indonesia's carbon trading system with international markets presents both significant opportunities and complex challenges. On one hand, participation in global carbon markets can attract foreign investment, facilitate technology transfer, and enhance the economic value of emission reductions, thereby supporting sustainable development goals [3], [13], [14]. These opportunities position Indonesia to benefit economically while advancing its climate commitments through access to capital and innovation in low-carbon technologies. On the other hand, such participation requires strict compliance with international standards, including transparency, environmental integrity, and the avoidance of double counting, which demands a higher level of regulatory and institutional readiness.

Presidential Regulation No. 98 of 2021 acknowledges the possibility of international carbon trading; however, it does not yet provide detailed provisions regarding cross-border transactions. This creates legal uncertainty, particularly concerning the recognition of Indonesian carbon credits in global markets [11]. Furthermore, Indonesia must align its regulatory framework with international standards to ensure credibility and acceptance, especially in areas such as transparency and environmental integrity [15]. Differences in certification and verification processes between Indonesia and other jurisdictions also present compatibility challenges that may hinder effective participation in global carbon markets [3].

From a sovereignty perspective, the government must carefully balance international cooperation with the protection of national interests. The export of carbon credits, for instance, must be regulated to ensure that it does not compromise Indonesia's ability to achieve its domestic emission reduction targets. This underscores the importance of developing a comprehensive and coherent legal framework for international carbon trading that not only meets global standards but also safeguards national priorities, ensuring that economic benefits do not come at the expense of long-term environmental commitments.

### 3.5 Regulatory Gaps and Future Directions

The analysis reveals several regulatory gaps that must be addressed to ensure the effective implementation of carbon trading in Indonesia. First, there is a need for more detailed implementing regulations that clearly specify technical procedures, institutional roles, and enforcement mechanisms, as the current framework remains largely declarative and difficult to operationalize. Second, regulatory harmonization across sectors is essential, given that carbon trading intersects with environmental protection, energy transition, and financial regulation. A coordinated approach—such as establishing a central coordinating body or strengthening inter-agency collaboration—is necessary to prevent inconsistencies, overlaps, and fragmented policy implementation.

Furthermore, capacity building and stakeholder engagement play a crucial role in enhancing market readiness. The government needs to invest in education, training, and technical assistance to improve understanding of carbon trading among businesses and local communities, while also developing digital infrastructure and financial instruments to support efficient market operations. In conclusion, although Presidential Regulation No. 98 of 2021 provides a foundational legal framework, its implementation still faces significant legal, institutional, and operational challenges,

which require a comprehensive strategy combining regulatory refinement, institutional strengthening, and active stakeholder participation to ensure carbon trading effectively contributes to Indonesia's climate goals and sustainable economic development.

## 4. CONCLUSION

This study demonstrates that the implementation of carbon trading in Indonesia under Presidential Regulation No. 98 of 2021 is legally grounded and represents a significant advancement in integrating environmental objectives with economic mechanisms. The regulation provides a formal framework for carbon pricing instruments and aligns national policy with global commitments under the Paris Agreement, thereby fulfilling the basic requirement of legality from a normative legal perspective and reflecting Indonesia's commitment to climate governance reform. However, the findings also indicate that the effectiveness of carbon trading remains constrained by several structural and operational challenges, including the absence of detailed implementing regulations, fragmentation of institutional authority, limited capacity in monitoring and verification systems, and insufficient market readiness among stakeholders, as well as legal uncertainty related to international carbon market integration.

Therefore, it is necessary for the Indonesian government to strengthen regulatory harmonization, clarify institutional roles, and develop more comprehensive technical guidelines to support the implementation of carbon trading. In addition, enhancing institutional capacity, improving data systems, and fostering active stakeholder participation are critical to ensuring effective market operation. With these improvements, carbon trading holds strong potential to become a reliable and effective policy instrument for achieving Indonesia's emission reduction targets while simultaneously promoting sustainable economic development.

## REFERENCES

- [1] T. G. Budak, *Beyond Treaties: Rethinking Legal Mechanisms for International Climate Governance*. Springer, 2025.
- [2] V. S. Husada and I. E. Joesoef, "Legal Policy of the Indonesian Government to Achieve Net Zero Emissions," *J. Res. Soc. Sci. Econ. Manag.*, vol. 1, pp. 128–133, 2022.
- [3] M. Andrian, R. N. Harahap, and M. Purnomo, "Peran Perseroan sebagai Pelaku Usaha Perdagangan Karbon untuk Mitigasi Perubahan Iklim," *J. Locus Penelit. dan Pengabd.*, vol. 4, no. 8, pp. 7627–7639, 2025.
- [4] D. A. Rahmawati, H. Haryono, B. Endarto, J. Soraya, and J. Nurani, "The Role of Carbon Trading in Climate Change Mitigation: A Juridical Analysis of Policies and Regulations in Environmental Law in Indonesia," *East J. Law Hum. Rights*, vol. 3, no. 01, pp. 38–48, 2024.
- [5] A. Sudarwanto and Daryanti, "Examining legal tools in encouraging the achievement of net zero emission: A way forward for Indonesia," *IOP Conf. Ser. Earth Environ. Sci.*, vol. 1438, p. 12018, Jan. 2025, doi: 10.1088/1755-1315/1438/1/012018.
- [6] P. Dirgantara, "Reflecting on REDD+: Challenges towards Indonesia's carbon pricing," in *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, 2022, p. 12003.
- [7] L. Buana, "Legal Analysis on Peraturan Presiden No. 98 Tahun 2021: Nilai Ekonomi Karbon (NEK) Carbon Pricing in Indonesia," *J. Cent. Bank. Law Institutions*, vol. 2, no. 1, pp. 179–198, 2023, doi: <https://doi.org/10.21098/JCLI.V2I1.46>.
- [8] E. B. Demmalino and M. Salahuddin, "Institutional Readiness for Inclusive Carbon Market Development in Indonesia," *J. Cult. Anal. Soc. Chang.*, pp. 429–438, 2025.
- [9] W. Prihatiningtyas, S. Wijoyo, I. Wahyuni, and Z. M. Fitriana, "Perspektif keadilan dalam kebijakan perdagangan karbon (carbon trading) di indonesia sebagai upaya mengatasi perubahan iklim," *Refleks. Huk. J. Ilmu Huk.*, vol. 7, no. 2, pp. 163–186, 2023.
- [10] T. Z. Bella, "Pengaturan Perdagangan Bursa Karbon Di Indonesia Serta Perbandingan Pengaturan Perdagangan Bursa Karbon Dengan New Zealand," *Mahkamah J. Ris. Ilmu Huk.*, vol. 2, no. 2, pp. 8–18, 2025.
- [11] D. A. Rahmawati, B. Endarto, J. Soraya, and S. Ngaisah, "Carbon Trading and Environmental Justice : A Juridical Examination of Fairness in Indonesia ' s Emissions Reduction Initiative," vol. 2, no. 04, pp. 429–436, 2024.
- [12] P. S. J. Kennedy, "Kajian normatif atas pengukuran, pelaporan, dan verifikasi dalam perdagangan karbon," *IKRAITH-HUMANIORA J. Sos. dan Hum.*, vol. 9, no. 1, pp. 154–166, 2025.
- [13] T. Mukti, "Bursa Karbon Sebagai Katalisator Ekonomi Berkelanjutan: Strategi Indonesia Mencapai Net Zero Emission 2060," in *Proceedings National Conference Sinesia*, 2025, pp. 443–455.
- [14] R. R. Prananda, B. J. Puji Hapsari, B. B. Widya Puryanta, L. M. Sandy, and H. Widanarti, "Examining Carbon Trading Policies to Address Climate Change Risks and Realize Sustainable Development in Indonesia," in *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, 2025, p. 12034.
- [15] T. Danuwijaya and T. G. Ongom, "Carbon Credits and Compliance: Assessing Indonesia's Progress on Article 6.2 Implementation (2019–2023)," *JOSH J. Sharia*, vol. 4, no. 01, pp. 36–52, 2025.