

Potential and Risks of Money Laundering in Carbon Trading

Adiwarman

Faculty of Administrative Sciences, University of Indonesia, Indonesia

Corresponding author: adiwarman2012@gmail.com

Keywords:

Carbon Exchange, Carbon Rights, Carbon Trading, Carbon Units, Money Laundering

Abstract

Climate change is a global issue with visible impacts such as rising sea levels, heat waves in temperate countries, mutations of certain viruses, and melting ice in the Arctic. The primary solution to this problem is reducing greenhouse gas emissions through domestic efforts on various projects and additional mechanisms such as carbon trading. However, as an innovation in the financial services sector, carbon trading poses risks and potential for money laundering (ML) use. This study aims to provide an overview of current carbon trading practices and discuss the potential for using carbon trading for ML in Indonesia. It also aims to address relevant legal principles and issues. The study employs descriptive-analytical and normative methods to identify ML potential and uncover substantive issues within existing legal provisions. The results reveal that the mechanisms of using carbon credits and rights are vulnerable to ML use in and outside the Carbon Exchange (primary market). Moreover, the underdeveloped state of trading systems, institutions, legal provisions, transparency, and supervision exacerbates this. Prevention measures include implementing Know Your Customer principles and reporting suspicious financial transactions. Law enforcement refers to the provisions of Articles 3, 4, 5, and 6 of the Money Laundering Law.

Submitted: 27 August 2023

Accepted: 31 May 2024

Published: 1 June 2024

Copyright (c) Author



To cite this article: Adiwarman. 2024. *Potential and Risks of Money Laundering in Carbon Trading*. *AML/CFT Journal: The Journal of Anti Money Laundering and Countering the Financing of Terrorism* 2(2):126-146, <https://doi.org/10.59593/amlcft.2024.v2i2.136>

Introduction

Climate change has become a global issue, with its impacts currently being felt in various forms, such as rising sea levels submerging islands and archipelagic nations, heatwaves in temperate countries, the spread of certain viruses, and the melting ice in the Arctic. The detrimental effects of industrialization were predicted centuries ago by experts such as Joseph Fourier (1768-1830), Svante Arrhenius (1859-1927), and Knut Angstrom (1857-1910), who warned about the accumulation of greenhouse gases resulting from fossil fuel use.¹ Modern life heavily relies on industrial machinery that generates pollution, exacerbating the situation.²

¹ Sumali Dissanayake, Renuka Mahadevan, John Asafu-Adjaye, "Evaluating the Efficiency of Carbon Emissions Policies in a Large Emitting Developing Country," *Energy Policy* 136 (2020) 111080: 1. <https://doi.org/10.1016/j.enpol.2019.111080>.

² *Ibid.*

Consequently, pollution has become an integral part of modern life.³ Regardless of which entities contribute more to the current levels of greenhouse gases, by 2022, at least 2047 declarations of climate emergencies were made in 37 countries,⁴ signaling a severe climate crisis leading to potentially catastrophic outcomes if not sustainably addressed. Experts assert that climate change is a human-induced phenomenon,⁵ not a natural occurrence, implying that humans, both as nations and individuals, can tackle this problem.

The issue of climate change transcends national borders, impacting everyone and potentially widening social inequalities.⁶ Reducing greenhouse gas emissions is more expensive than initially releasing them,⁷ posing a significant challenge for financially constrained countries. Developing nations face the dilemma of allocating budgets to reduce emissions while striving to improve welfare.

The most effective initial step in reducing greenhouse gas emissions is fostering global communication to coordinate efforts against climate change. The United Nations (UN) convened a conference in Rio de Janeiro, Brazil, in 1992, resulting in the United Nations Framework Convention on Climate Change (UNFCCC), the international legal framework for addressing climate change. In 1997, the Conference of Parties (CoP) meeting in Kyoto, Japan, led to the Kyoto Protocol, a progressive agreement to reduce global greenhouse gas emissions. Countries committed to this protocol are listed under Annex 1, while other countries are included in Annex 2, voluntarily undertaking emission reduction efforts. Domestic efforts are the primary means of reducing greenhouse gas emissions, as stipulated in the Kyoto Protocol.

The uniqueness of the Kyoto Protocol lies in its allowance for additional mechanisms, particularly market-based mechanisms, known as carbon trading. These are detailed in Article 6 for the Clean Development Mechanism (CDM), Article 12 for Joint Implementation (JI), and Article 17 for Emission Trading. Using market mechanisms to address pollution was inspired by the United States' efforts to reduce sulfur emissions in the 1990s.⁸ However, the success of this market mechanism in the US was due to its application within a single country. In contrast, the Kyoto Protocol faces the challenge of global implementation. All countries ratifying the protocol must reduce greenhouse gas emissions according to set targets.

The flexibility of the greenhouse gas emission reduction mechanisms provided by the Kyoto Protocol has been a significant issue in discussions and debates regarding its implementation. Market mechanisms provide opportunities for all parties to engage in emission reduction efforts. By including carbon trading as an additional mechanism in the Kyoto Protocol, it has been regarded as an effective method for reducing global greenhouse gas

³ J.H. Dales, *Pollution, Property & Prices: An Essay in Policy-Making and Economics*, Chentelham: Edward Elgar, 2002, 1-3.

⁴ Eoin Jackson, "Climate Emergency Declarations and the Transition to a Sustainable Corporate Model - Justifying Emergency Measures to Create a Green Business Framework," *The King's Student Law Review*, Vol XII, Issue I, 30-57, (2022): 31-32.

⁵ Jeremy Freeman, "Efficacy of Carbon Taxes and Recommendations for Cutting Carbon Emissions," *Houston Business and Tax Law Journal* 15, no. 2 (2015): 268-299. *Advocates opposed to the idea that climate change is occurring have sometimes confused the climate change issue by referring to claims made by "climate science" and by claiming that climate science is uncertain. The popular media has also contributed to much of the confusion about climate science. Nevertheless, with the current available science, there is a near 97 percent agreement among climatologists-those who devote their available time to studying climate science issues-that the earth, on average, is getting warmer and that this increased temperature is "very likely due to human activities".*

⁶ Shi-Ling Hsu, "Carbon Taxes and Economic Inequality," *Harvard Law & Policy Review* 15, no. 2 (2021): 551-570.

⁷ Albert C. Lin, "Carbon Dioxide Removal after Paris," *Ecology Law Quarterly* 45, no. 3 (2018): 533-582.

⁸ Joseph E. Aldy, "Evaluating Regulatory Performance: Learning from and Institutionalizing Retrospective Analysis of EPA Regulation," *Case Western Reserve Law Review* Vol. 70, (2020).

emissions. In fact, the terminology and mechanisms of carbon trading emerged thanks to the Kyoto Protocol. Carbon trading's distinctiveness lies in its role as part of the Climate Change Regime, where the technical legal basis evolves according to international agreements and negotiations.

Several critical points about the Kyoto Protocol include 1) doubts about the effectiveness of its flexible mechanisms in reducing greenhouse gas emissions; 2) the use of greenhouse gas absorption projects as a loophole to avoid actual emission reductions; 3) the targets set by the Kyoto Protocol are considered insufficient to stabilize greenhouse gas emissions; 4) the weak implementation of soft law impacts economic growth; and 5) the minimum requirement for ratification should be met by at least 55 countries.⁹ Debates during the CoP forums continue, particularly with the reluctance of the United States and Australia. The countries' mitigation contribution of less than 30% of total greenhouse gases is a contentious issue.¹⁰ This means that countries believe a 30% reduction in greenhouse gas emissions can be tolerated in relation to their economic growth. However, achieving the greenhouse gas emission levels of the 1990s requires a reduction target exceeding 30%. For instance, CO₂ levels in 2022 were around 37.5 gigatons, a 60% increase since the 1990s.¹¹ Reducing greenhouse gas emissions requires a collective effort from all countries striving to return to the emission levels of the 1990s. Quantitatively, an exact measure is needed to achieve the reduction of greenhouse gas emissions.

One limitation of the Kyoto Protocol was its short duration (2008-2012), which extended to 2015. To continue reducing greenhouse gas emissions, participants at the 15th CoP in Paris, France, agreed to proceed with emission reduction efforts under a new normative framework called the Paris Agreement. This agreement was accepted and approved as the legal successor to the Kyoto Protocol for ongoing global greenhouse gas emission reduction efforts. One major debate sparked by the Paris Agreement was the end of the mandatory and voluntary country statuses. Instead, all countries were given equal standing, with the authority to independently pledge their commitments to reduce greenhouse gas emissions through Nationally Determined Contributions (NDC). The strategy remains the same: a collective domestic effort to reduce greenhouse gas emissions.

Although the Paris Agreement does not explicitly use the term "trading," Article 6, paragraph 2, still permits trading mechanisms to achieve NDC targets, provided countries agree to it. The Paris Agreement does not detail the specific efforts required by each country to achieve their NDCs, leaving the approach to greenhouse gas emission reduction up to each nation without providing quantitative measures.¹² Carbon trading is an additional mechanism proposed within the NDC framework under the global climate change regime to reduce greenhouse gas emissions. However, as an innovation in the financial services sector, carbon trading is not immune to the potential for being used for money laundering (ML). This paper aims to identify and analytically explore the current carbon trading practices and analyze the potential and risks of its use for ML. This issue needs attention, particularly as carbon trading is not yet well-known in Indonesia. With Indonesia establishing its Carbon Exchange in September 2023, the need to be vigilant about the potential for ML has become more pressing.

⁹ Robin Eckersley, *Soft Law, Politik Keras, Traktat Perubahan Iklim* dalam Christian Reus-Smit [Soft Law, Hard Politics, Climate Change Treaty] in Christian Reus-Smit, *Politik Hukum Internasional*, Malang: Nusa Media, 2015, 135-139.

¹⁰ Deni Bram, *Hukum Perubahan Iklim: Perspektif Global dan Nasional [Climate Change Law: Global and National Perspectives]*, Malang: Setara Press, 2016, 154.

¹¹ Ian Tiseo, *Emisi karbon dioksida global tahun 1940-2023 [Global carbon dioxide emissions 1940-2023]* (<https://www-statista-com>, 2024), <https://www-statista-com.translate.google/statistics/276629/global-co2-emissions/> accessed April 18, 2024.

¹² Thiagarajan Jayaraman, "The Paris Agreement on Climate Change: Background, Analysis, and Implications," *Review of Agrarian Studies* 5.

This research was carried out using a descriptive-analytical research method combined with normative aspects to provide an overview of the potential of carbon trading as a means for ML. The normative research method is useful for finding the substance of legal provisions seen as problems. Descriptive-analytical research provides answers or explanations regarding aspects of carbon trading. Descriptive research is intended to provide answers or explanations regarding the determination of carbon rights, the process of commodifying carbon assets into carbon credits, the position of carbon trading in the Climate Change Regime, the characteristics of carbon trading, and TPPU. The analysis was carried out using descriptive research to open more potential for the occurrence of TPPU in carbon trading. Then, it was closed with normative research to reach TPPU on carbon trading. Normative research¹³ is useful for answering legal questions ranging from legal principles to relevant legal provisions.

Mechanisms for Reducing Greenhouse Gas Emissions

Countries technically employ carbon trading, carbon taxes, or a combination of both to reduce greenhouse gas emissions, applicable under both the Kyoto Protocol and the Paris Agreement. Research comparing carbon taxes and carbon trading is ongoing. A study by Xu Hu et al. (2020) concluded that 1) carbon trading is more suitable for controlling greenhouse gas emissions in the manufacturing sector, helping industries become more environmentally friendly and promoting cleaner production activities; 2) carbon trading enables manufacturing companies to optimize business processes and enhance cleaner production with less pollution; 3) under the Emissions Trading Scheme (ETS), it is preferable to set pollution quotas or permits at low prices; otherwise, a carbon tax is more effective for reducing greenhouse gas emissions.¹⁴ The advantage of carbon trading is the allocation of quotas that can be adjusted for specific parties, offering incentives and benefits through rising carbon unit prices.¹⁵ However, carbon trading is susceptible to economic shocks, has volatile success metrics, and fundamentally alters production patterns.¹⁶ Overall, the effectiveness of carbon trading and taxes is relatively similar, each with advantages and disadvantages. Their use depends on the characteristics and needs of the respective country.

Carbon trading offers a way to control greenhouse gas emissions through pollution permit quotas. Quantitatively, quotas can be reduced annually, as seen with the European Union's EU ETS. These quotas are linked to the greenhouse gas emission targets outlined in a country's NDC. One method to determine pollution permit allocation is based on historical emission data from targeted entities. If a country's economy is industrial-based, most pollution permits are allocated to industrial companies, with the remainder given to entities supported for growth and governmental institutions capable of reducing emissions.¹⁷

Carbon trading offers a way to control greenhouse gas emissions through pollution permit quotas. Quantitatively, quotas can be reduced annually, as seen with the European Union's EU ETS. These quotas are linked to the greenhouse gas emission targets outlined in a country's NDC. One method to determine pollution permit allocation is based on historical emission data

¹³ Purnadi Purbacaraka, Soerjono Soekanto, *Sendi-sendi Ilmu Hukum dan Tata Hukum [Joins of Law and Legal Governance]*, Bandung: Alumni 1979; Sudikno Mertokusumo, *Mengenal Hukum*, Yogyakarta: Liberty, 1999; Peter Mahmud Marzuki, *Pengantar Ilmu Hukum*, Jakarta: Prenada Kencana Media, 2008.

¹⁴ Xu Hu, Zhaojun Yang, Jun Sun, Yali Zhang, "Carbon Tax or Cap-And-Trade: Which Is More Viable for Chinese Remanufacturing Industry?" *Journal of Cleaner Production* 243 (2020) 118606: 10.

¹⁵ Jingrong Guo, Yue Xiang, "Cost-benefit analysis of Gencos Market Trading with Carbon-Tax and Cap-and-Trade Policies," *Energy Reports* 8 (2022): 900-907.

¹⁶ Yazid Dissou, Lilia Karnizova, "Emissions Cap or Emissions Tax? A Multi-Sector Business Cycle Analysis," *Journal of Environmental Economics and Management* 79 (2016): 169-188.

¹⁷ Shubham Janghu, Armin Rosencranz, "Fighting India's War on Carbon with an Emissions Trading Program," *5 Nat'l L.U. Delhi Stud. L.J.* 57 (2018): 57-70.

from targeted entities. If a country's economy is industrial-based, most pollution permits are allocated to industrial companies, with the remainder given to entities supported for growth and governmental institutions capable of reducing emissions.¹⁸

The ETS encompasses three aspects: the foundational concept, an explanation of carbon units, and consistency in the trading system.¹⁹ Carbon trading mechanisms require trading instruments called carbon units, divided into carbon rights (also known as allowances or pollution permits) and carbon credits. Carbon credits are issued to recognize emission reduction efforts through projects like forest rehabilitation, mangrove restoration, and energy transitions. Emission reduction efforts from these projects are constructed as carbon assets. To be tradable, carbon assets must be commodified into carbon units, such as carbon credits. Conversely, carbon rights automatically become tradable if greenhouse gas emissions during a given period are below the target. Surplus carbon rights serve as incentives for holders due to successful emission reductions. Carbon trading is the most cost-effective and efficient method to achieve greenhouse gas emission reduction targets.

Major economies such as the European Union, the United States, China, Japan, and South Korea have established Emissions Trading Schemes (ETS) to reduce greenhouse gas emissions. ETS is integral to environmental management strategies aligned with mainstream economic principles, particularly capitalism.²⁰ Carbon trading is implemented as an alternative to carbon tax policies, proving an effective mechanism for reducing greenhouse gas emissions. It facilitates compensation, harmonizes with other countries' climate policies, and circumvents political resistance to taxation.²¹ Despite causing geographic shifts, carbon trading has generally succeeded in meeting environmental targets and accelerating the market exit of gasoline faster than anticipated.²² Carbon trading can be traced back to the concept of carbon unit transfers as stipulated in the Kyoto Protocol.²³ The terminology of transfers is also embraced in Article 6, paragraph 2, of the Paris Agreement for Mitigation Outcomes (MtO) of carbon units.

ETS can drive up the price of carbon units. Ann E. Carlson warns that if carbon trading is chosen as the core of climate policy, supporting policies must be developed to reduce market flexibility, which could otherwise lead to higher carbon unit prices.²⁴ Carbon trading differs from conventional trading as it results from global agreements to mitigate climate change enshrined in international treaties. In practice, carbon trading is an effective framework for governments to control and reduce greenhouse gas emissions and provides a cost-efficient means for obligated parties to meet their emission targets. When the Kyoto Protocol expired in 2012, countries recognized the necessity of extending it for three more years. In 2015, the Paris Agreement replaced the Kyoto Protocol to continue mitigating climate change. Although less explicit than the Kyoto Protocol, the Paris Agreement's Article 6, paragraph 2, still offers prospects for continuing carbon trading amidst potential market failures in addressing externalities.²⁵ Professor Andri emphasizes that externality costs must be fully considered to

¹⁸ Anatole Boute, Hao Zhang, "Fixing the Emissions Trading Scheme: Carbon Price Stability in the EU and China," *European Law Journal* 25, no. 3 (2019): 333-347.

¹⁹ Greg Kaza, "Carbon Trading and International Trade," *Regulation* 42, no. 3 (Fall 2019): 52-53.

²⁰ Boute, Hao Zhang, "Fixing the Emissions...", 334.

²¹ Robert N Stavins, "Cap-and-Trade or Carbon Tax," *Environmental Law Institute*, 2008: 16.

²² Richard Schmalensee, Robert N. Stavins, "Lessons Learned from Three Decades of Experience with Cap and Trade," *Review of Environmental Economics and Policy*, volume 11, issue 1, Winter 2017: 59-79 doi:10.1093/reep/rew017.

²³ David Freestone, Charlotte Streck, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen and Beyond*, Oxford: Oxford University Press, 2009, 157.

²⁴ Ann E. Carlson, "Designing Effective Climate Policy: Cap-And-Trade and Complementary Policies," *Harvard Journal on Legislation* Vol. 49, (2012): 224.

²⁵ Muhamad Ramadan Andri Gunawan Wibisana, *Law and Economic Analysis of Precautionary Principle*, Maastricht: Universitaire Pers Maastricht, 2008: 82.

prevent market failures from impacting social objectives, echoing Dales' view that pollution is a social issue.²⁶ Professor Andri also states that once carbon trading is established as a framework for reducing greenhouse gas emissions, the relevant stakeholders entirely manage the process. Market failures fall within the private sector's domain and are not the government's responsibility.

Commodification of Carbon Assets into Carbon Units

The Kyoto Protocol promotes trading as an additional mechanism in the global effort to address climate change by reducing greenhouse gas emissions, leading to the commodification of carbon assets. This commodification is a legal process to transform carbon assets into tradable instruments. The Kyoto Protocol strongly influences the use of market mechanisms to achieve greenhouse gas emission reductions.

1. Legal Characteristics of Carbon Units

Over time, carbon trading has been a contentious issue. The carbon trading framework involves trading goods or commodities known as carbon units. Carbon units are resources that can be claimed as private property. This is considered the most efficient means of allocating resources and providing incentives for utilizing productive resources.²⁷ The externalities resulting from carbon trading are borne by society due to its productive activities; therefore, the polluters should bear the costs or damages. On the other hand, polluters or emitters generate negative externalities and contribute to a country's economic growth. Considering the benefits and drawbacks of reducing greenhouse gas emissions, the existence of carbon trading activities gains justification.

The core issue in carbon trading is the characteristics of carbon units. In legal terms, carbon units are regarded as property or proprietary rights. Under Civil Law, as adopted from the *Burgerlijk Wetboek* (BW),²⁸ property is classified into movable and immovable objects. Historically, especially before Indonesia's independence, the recognized property was land, conferring various rights such as ownership (*eigendom*) or usufruct (*erfpacht*). Ownership is a natural right,²⁹ meaning the holder does not need to claim it actively but only needs to show proof of ownership recognized or issued by the state. In other words, a claim is only necessary when another party contests ownership of the same property.

In contrast to civil law, common law views ownership as the expectation or belief in the ability to derive benefits from the owned property.³⁰ Property law follows the rightful owner; thus, ownership is a crucial element in the governance system of a society.³¹ Ownership is a critical issue in modern (capitalistic) societies that drives the economic engine and the opportunities it generates.

Interestingly, public goods like air and water cannot be owned.³² Air and water are resources that are everyone's rights within a specific national jurisdiction. As natural resources, the precautionary principle is applied as an anticipatory approach. Regulators are reminded to

²⁶ Dales, *Pollution, Property &...*, 12-13.

²⁷ Richard Barnes, *Property Rights and Natural Resources*, Oxford: Hart Publishing, 2009, 41.

²⁸ Wirjono Prodjodikoro, *Hukum Perdata Tentang Hak Atas Benda [Civil Law on Rights to Objects]*, Jakarta: Intermedia, 1986, 4-5.

²⁹ C.A.B. MacPherson, *Pemikiran Dasar Tentang Hak Milik [Basic Thoughts on Property Rights]*, Jakarta: Yayasan LBH Indonesia, 1989, 4.

³⁰ *Ibid.*, 63.

³¹ Barnes, *Property Rights and...*, 49-50.

³² *Ibid.*, 50.

avoid harm to these resources when applying this principle.³³ This view contrasts with the market approach to mitigate climate change or reduce greenhouse gas emissions.

Despite theoretical and philosophical disputes regarding carbon trading from the perspectives of Property Rules, Liability Rules, and Inalienability,³⁴ efficiency in achieving greenhouse gas emission reduction targets is the offered solution, where ownership (proprietary rights) provides incentives for efforts towards this goal.³⁵ In initial ownership, justice is why economic efficiency and distribution need conceptual and practical consideration.³⁶ The efficiency offered by carbon trading should be examined from the perspectives of Property Rules, Liability Rules, and Inalienability, with carbon units as the instrument.³⁷ The practical aspect of carbon trading centers on its tradable instrument, the carbon unit.

2. Carbon Units as Trading Instruments

Carbon units serve as tradable instruments, granting their owners the right to use or transfer them.³⁸ In both civil law and common law perspectives, carbon units, whether carbon rights or carbon credits represent commodities used for greenhouse gas emissions, which can be transferred to interested buyers. Carbon rights are limited in supply and allocated by the government to entities obligated to reduce greenhouse gas emissions. In contrast, carbon credits are issued to prove greenhouse gas absorption from forest rehabilitation, conservation, mangrove restoration, and clean energy adoption projects.

The value of carbon rights is determined by the government. For example, one carbon right may equate to the permission to emit one ton of greenhouse gases. The price of carbon rights is influenced by supply and demand, driven by polluters who must meet government-set emission

³³ Wibisana, *Law and Economic...*, 85-86.

³⁴ Guido Calabresi, Douglas Melamed, Property Rules, Liability Rules, and Inalienability: One View of the Cathedral, *Harvard Law Review*, Vol. 85, No.6, (1972): 1102. *In our framework, much of what is generally called private property can be viewed as an entitlement which is protected by a property rule. No one can take the entitlement to private property from the holder unless the holder sells it willingly and at the price at which he subjectively values the property. Yet a nuisance with sufficient public utility to avoid injunction has, in effect, the right to take property with compensation. In such a circumstance the entitlement to the property is protected only by what we call a liability rule: an external, objective standard of value is used to facilitate the transfer of the entitlement from the holder to the nuisance. Finally, in some instances we will not allow the sale of the property at all, that is, we will occasionally make the entitlement inalienable.*

³⁵ Steven Shavell, *Foundations of Economic Analysis of Law*, Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 2004, 11.

³⁶ Calabresi, Melamed, "Property Rules, Liability..." 105-106.

³⁷ Giuseppe Dari-Mattiacci, Josephine van Zeben, "Legal And Market Uncertainty In Market-Based Instruments: The Case Of The EU ETS," *New York University Environmental Law Journal* Vol. 19, 2012, 449. *The present discussion unveils an important analogy between the mechanisms that preside over the transmission of legal uncertainty to market uncertainty and the effect of court decisions on the level of scarcity. In both cases, the use of annulment (a property-rule remedy) is highly disruptive. The impact of litigation on scarcity has not yet been explored; our analysis shows that the use of alternative, liability-rule remedies prevents additional allowances from coming into the market through litigation and thus would safeguard the predetermined level of scarcity. However, the problems of scarcity and market uncertainty remain distinct insofar that scarcity is affected only by the final outcome of litigation, whereas market uncertainty is generated by the mere possibility of an increase in allowances. If the court decides against a market participant petitioning for more allowances, the (ex post) level of scarcity is not affected but, as we have shown, the costs caused by market uncertainty have already occurred since they are related to the (ex ante) uncertain outcome of litigation rather than the actual outcome. Further work must be done to consider this link between litigation and scarcity in artificial markets. This paper has started by introducing methods of limiting market uncertainty as caused by legal uncertainty through the use of specific economic efficiency of market-based legal remedies. The incorporation of these observations will hopefully contribute to the regulatory regimes such as the EU ETS.*

³⁸ Freestone, Streck, "Legal Aspects of..." 44.

caps.³⁹ Failure to meet these caps prompts the purchase of available carbon rights in the Emissions Trading System (ETS). Such scarcity can increase the price of carbon rights, incentivizing those who successfully reduce emissions by selling their surplus rights.

Conversely, if entities meet their emission reduction targets, carbon unit prices may stabilize from moderate to low levels. Nonetheless, surplus carbon units retain strategic value as they can be used by their owners to meet future emission targets. Carbon units are proprietary rights with ownership characteristics, including exclusive use and the right to transfer to others. As noted by Jillian Button, trading carbon units raises legal questions about their nature, affecting the trading system established by relevant authorities.

Carbon rights resemble securities traded due to surplus emissions. If carbon units are classified as securities, they are traded on the stock market, possibly on a separate board with a specific code. If deemed commodities, they are traded on commodity exchanges. Carbon credits align more closely with commodities due to their issuance based on projects reducing greenhouse gas emissions, such as forest rehabilitation, mangrove restoration, and transitioning from fossil fuels to renewable energy sources like geothermal, steam, hydropower, wind, and solar energy. Environmental rehabilitation supports greenhouse gas absorption, and involving indigenous communities aligns with national and global interests. The local wisdom of indigenous peoples serves as a valuable social asset for mitigation efforts, enabling the commodification of natural assets into carbon units.⁴⁰

The utilization of new and renewable energy significantly reduces greenhouse gas emissions. These energy sources are central to modern urban living. Engaging urban populations in managing their household energy use is strategic. Activities promoting environmental-friendly energy use or savings can be converted into carbon credits and traded on the carbon market for incentives. If this becomes widespread, numerous carbon credits will be available from renewable energy or energy-saving measures. Thus, carbon trading incentivizes emission reduction efforts involving various national components, including legal entities, businesses, communities, and individuals.

Furthermore, carbon units can be designated as specialized trading instruments on dedicated exchanges. This specialization facilitates market participants, mitigation actors, and potential investors in easily identifying available carbon units in the market.

3. Carbon Trading Practices

Guidelines for carbon trading practices with carbon rights using ETS in accordance with the Paris Agreement can be seen in Table 1.

Table 1. Guidelines for reducing greenhouse gas emissions⁴¹

Principles	Voluntary participation, environmental integrity, sustainable development, bottom-up approach, rule-based system, and socio-economic impact.
Definition	Acquiring Party; Issuing Party; Transferring Party; User Party; Cooperation Approach; Adjustments; Double Counting (avoidance of duplicate claims, issuance, registration, or usage of carbon units); Environmental

³⁹ Arnaud Brohe, Nick Eyre, Nicholas Howarth, *Carbon Markets: An International Business Guide*, London: Earthscan, 2009, 43.

⁴⁰ Irene Mariane, *Kearifan Lokal: Pengelolaan Hutan Adat [Local Wisdom: Customary Forest Management]*, Jakarta: Rajawali Press, 2014, 107.

⁴¹ Ling Chen, "Are Emissions Trading Schemes a Pathway to Enhancing Transparency Under the Paris Agreement?" *Vermont Journal of Environmental Law Spring*, (2018): 311.

	Integrity; Internationally Transferred Mitigation Outcomes (ITMOs) or technical term for carbon units transferred internationally.
Governance	Authority Roles; Supervision; Article 6 Paragraph 2 or processes under Article 4.13, Article 13, and Article 15 of the Paris Agreement; UNFCCC Secretariat Role.
User Guidelines	Participation Requirements; ITMO Sources; Accounting and Reporting of ITMO users to report their contributions to their Nationally Determined Contributions (NDCs); ITMO Evidence proving the achievement.
Infrastructure	National Registry; Reporting Standards; Balance Access; Blockchain.
Participation Requirements	General Requirements; NDC Qualification; Communication and Maintenance; NDC Target Types; Transparency Requirements; Advanced Requirements for Issuing/Transferring ITMOs related to Article 6 Paragraph 3; Record of ITMO Use/Transfer.
Accounting	Specific Accounting Guidelines; Issuing/Transferring Guidelines for entities issuing or transferring ITMOs for NDCs; Limits on the issuance, transfer, or use of ITMOs; Adjustment Timing.
Reporting	General Reporting (Requirements for all parties, focusing on environmental integrity and transparency); Environmental Integrity of ITMOs (Ensuring ITMOs are real, permanent, additional, and verified); Update on Accounting Approaches; Data on the original holder of ITMOs; Advanced Requirements for Issuing/Transferring ITMOs under Article 6 Paragraph 3.
Review	Supervision Provisions: Guidelines under Article 6.2 or alternative processes (Article 4.13, Article 13, Article 15); Non-Compliance Procedures; Review Mechanisms (Possible inclusion or exclusion of review processes).

Carbon trading is designed to reduce greenhouse gas emissions cost-effectively and efficiently. Ensuring market and environmental integrity is crucial in carbon trading to validate the fulfillment of commitments stated in NDCs. Technically, carbon trading is a government-led program aimed at regulating total greenhouse gas emissions reduction activities. This includes payment for each ton of emissions, incentives for reducing emissions, auctioning carbon rights, and setting emission limits.⁴² Unlike stock or commodity trading, carbon trading is anchored by international agreements ratified by countries to reduce greenhouse gas emissions. The carbon trading activities focus on achieving the targets outlined in NDCs. The process begins with setting greenhouse gas emission limits linked to the NDCs of respective

⁴² Rebecca Robbins, "A Toxic Relationship: Proposed Policy Solutions to Mitigate Climate Change's Effects on Freshwater Harmful Algal Blooms," *Texas Environmental Law Journal Spring*, Vol. 51, (2021): 149-150.

countries and specific economic sectors. Carbon rights and permits to emit greenhouse gases are allocated to all entities within these economic sectors at the start of the emission period. At the end of the emission period, all involved entities must surrender carbon rights equivalent to their emission levels. This results in three possible outcomes. First, balanced emissions. The entity's emissions match the allocated carbon rights. This means that greenhouse gas emissions are controlled, and the entity complies with its emission target, benefiting the government by maintaining controlled emission levels. Second, excess emissions. The entity's emissions exceed its carbon rights. The entity must purchase additional carbon rights from others with a surplus or buy carbon credits from another party. Last, surplus carbon units. The entity's emissions are lower than the allocated carbon rights, resulting in a surplus. In this scenario, carbon trading incentivizes entities that have successfully reduced their greenhouse gas emissions below the target.

In an Emission Trading Scheme (ETS), the government, as the regulator, sets a cap on the total greenhouse gas emissions allowed within clearly defined economic sectors. Emission allowances are then allocated or sold to entities within the ETS. At the end of a specified period, each entity must submit allowances equivalent to their emissions. Entities that emit less than their allowances can sell their excess allowances to other participants within the scheme. This incentivizes entities with lower emission reduction costs to reduce their emissions further, while those facing higher reduction costs can comply by purchasing allowances from the market.⁴³ This flexibility helps in achieving the overall emission reduction targets more cost-effectively.

Carbon trading is implemented in 24 ETS worldwide,⁴⁴ with China operating the most (7 regional ETS and 1 national ETS). However, the most established is the EU ETS, which has been operational since 2003. The EU's carbon trading scheme has enabled it to effectively control and gradually reduce its greenhouse gas emissions. Additional benefits include maintaining the ETS through regulations that require the creation of reserves for market stability and price control mechanisms to prevent abnormal price volatility and market manipulation.⁴⁵ In this context, the role of the government is crucial to ensure that carbon trading functions as intended.

Carbon trading, aimed at reducing greenhouse gas emissions, operates across national borders. Article 6 paragraph 2 of the Paris Agreement allows for the international transfer of ITMOs, provided countries agree to it. Given the limited availability of predetermined carbon rights, surplus carbon rights are not abundantly available in the market. As an alternative, carbon credits generated from projects like forest rehabilitation, including mangrove forests, forest conservation for greenhouse gas absorption, energy conservation, or renewable energy, are also offered in the carbon market. Carbon credits are issued based on the absorption achieved by a specific project. For instance, according to calculations by relevant authorities, a 100-hectare conservation forest can produce carbon credits valued at 1 ton of greenhouse gas emissions. Similarly, if communities save energy or use renewable energy, the government provides incentives through carbon credits that can be sold on the carbon market. This open and transparent carbon trading system is a platform for environmental investments to improve conditions.

The Potential of Carbon Trading as a Means for Money Laundering

Money laundering has gained momentum to be institutionalized as an international regime. The substance, standards, institutions, systems, and relationships among Financial Intelligence

⁴³ International Carbon Action Partnership, *Perdagangan Emisi Seluruh Dunia: Laporan Status ICAP 2021 [Worldwide Emissions Trading: ICAP Status Report 2021]*, ICAP 2022.

⁴⁴ *Ibid.*

⁴⁵ Boute, Hao Zhang, "Fixing the Emissions..." 341.

Units (FIUs) have been formulated and established under the Anti-Money Laundering and Counter-Terrorism Financing (AML/CTF) regime. The effectiveness of anti-money laundering regulations is evaluated based on their implementation, with the Financial Action Task Force on Money Laundering (FATF) conducting assessments of each country's enforcement of anti-money laundering laws. Generally, money laundering encompasses three stages. First, placement is the act of introducing illicit funds into the financial system. Second, layering moves illicit funds within the financial system to obscure their origin. Last, integration is using the laundered funds in legitimate sectors, making it easier for the funds to be reintegrated with the perpetrators.⁴⁶ The sophistication of transactions within the current system allows for the legalization of illicit funds.

Criminals may consider investing their illicit funds in carbon units traded on the Carbon Exchange.⁴⁷ Interpol provides illustrations of money laundering activities in the Carbon Exchange (Figure 1), indicating that money laundering patterns are consistent across various contexts, including carbon trading. The same model of money laundering activities can occur within the Indonesian Carbon Exchange.

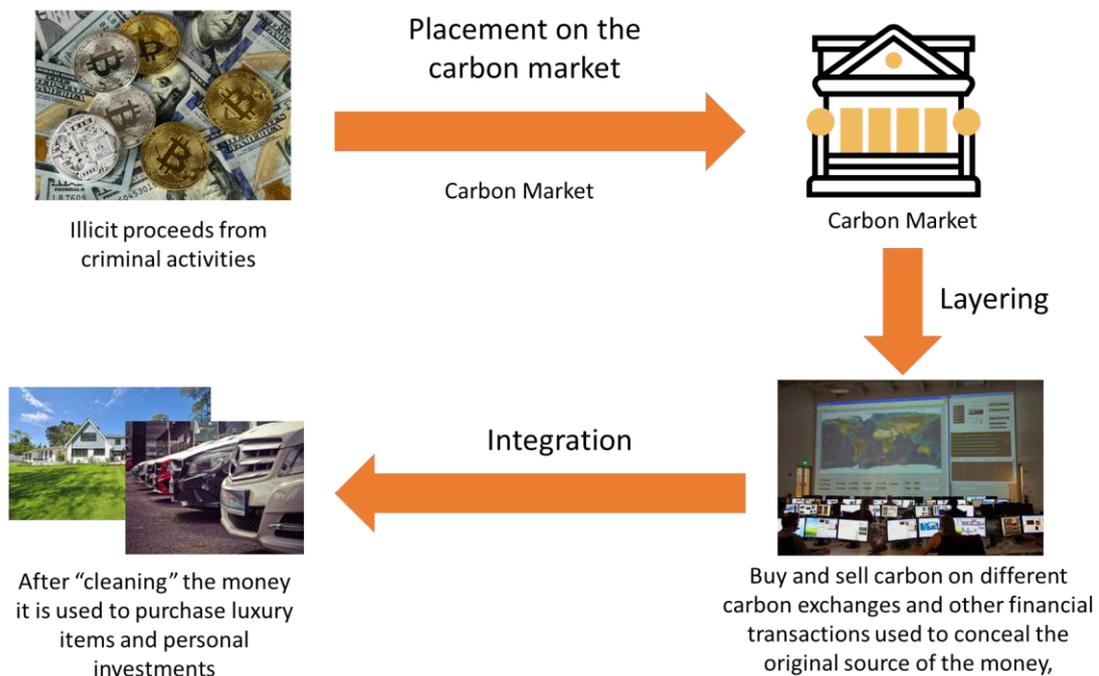


Figure 1. Illustration of Money Laundering in the Carbon Market as Depicted by Interpol

Carbon trading is similar to money laundering, as both are cross-border and can be conducted by individuals and legal entities. The Indonesian government has enacted Articles 3 to 6 of Law No. 8 of 2010 concerning the Prevention and Eradication of Money Laundering to regulate the fundamental provisions of money laundering activities committed by individuals or corporations. The open nature of carbon trading presents an opportunity for criminals to utilize illicit funds. Unlike stock or commodity trading, carbon trading is temporary, limited, and bound by international law, specifically the Paris Agreement.

⁴⁶ Ivan Yustiavandana, Arman Nefi, Adiwarman, *Tindak Pidana Pencucian di Pasar Modal [Crime of Laundering in the Capital Market]*, Jakarta: Ghalia Indonesia, 2010, 58-64.

⁴⁷ Interpol, *Guide to Carbon Trading Crime*, Interpol, 2013, 21.

Emission Trading Schemes (ETS) are established and implemented in various countries, allowing any party to offer or seek carbon units concerning the greenhouse gas emission targets set by the respective governments. The Paris Agreement stipulates that the valuation of carbon units is based on the principle of result-based payment, meaning that carbon units are valued based on the actual quantification of reduced greenhouse gas emissions.

Carbon trading is a global issue with legal implications for Indonesia, as it has committed to its NDC. The legal framework for carbon trading is outlined in several key regulations, including Law No. 16 of 2016 on the Ratification of the Paris Agreement to the United Nations Framework Convention on Climate Change; Government Regulation No. 46 of 2017 on Environmental Economic Instruments, later amended to PP No. 22 of 2021 on the Implementation of Environmental Protection and Management; and Presidential Regulation No. 98 of 2021 on the Implementation of Carbon Economic Value for Achieving Nationally Determined Contribution Targets and Controlling Greenhouse Gas Emissions in National Development. Additionally, Law No. 4 of 2023 on the Development and Strengthening of the Financial Sector mandates the establishment of a Carbon Exchange to facilitate carbon trading. The Financial Services Authority (OJK) has issued Regulation No. 14 of 2023 concerning carbon trading through the Carbon Exchange. This regulation categorizes traded carbon units as securities that must be registered in the National Registry System for Climate Change Control (SRN-PPI). The OJK regulation underscores Indonesia's strategy to reduce greenhouse gas emissions through carbon trading.⁴⁸ The future development of carbon trading in Indonesia will be influenced by the current state of the newly inaugurated Carbon Exchange.

Interpol has highlighted the potential for carbon unit theft within the carbon trading system, emphasizing the need for robust security measures in trading, storage, and data management systems. This indicates that carbon exchanges are susceptible to money laundering and other crimes associated with carbon units. The National Registry System for Climate Change Control (SRN-PPI) and IDX Carbon are crucial tools for the government, the Financial Services Authority (OJK), and exchange authorities to maintain the integrity of carbon trading. Money laundering in carbon trading can occur through emission reduction, emission absorption, or using renewable energy sources, all of which can earn carbon credits tradable on the carbon exchange. Indonesia and Cambodia significantly contribute to carbon credit issuance from the forestry and land-use sectors.⁴⁹ Given this fact, early detection and prevention efforts against money laundering are essential.

Carbon units have the potential to be used for money laundering. Indonesia is one of several countries supplying carbon credits to the global carbon market.⁵⁰ Unlike stock exchange instruments, carbon units have a limited validity period defined by applicable laws or climate change authority regulations. As tradable instruments, carbon units can be transferred and once registered with SRN-PPI, are legally tradable by the registering authority, enabling secondary trading outside the carbon exchange. Additionally, money launderers might purchase carbon credits issued by entities engaged in greenhouse gas emission reduction, absorption, or storage efforts.

⁴⁸ Kendati, mekanisme lain yang diatur dalam ketentuan Undang-Undang Nomor 7 Tahun 2023 tentang Harmonisasi Peraturan Perpajakan menyebutkan tentang Pajak Karbon di Pasal 13. Artinya, ketika Pemerintah memutuskan untuk menggunakan Pajak Karbon sebagai mekanisme pengendalian dan juga penurunan emisi gas rumah kaca maka dasar hukum pengenaannya sudah ada [Law Number 7 of 2023 Concerning the Harmonization of Tax Regulations, carbon tax is mentioned in Article 13. This means that when the government decides to use the carbon tax to control and reduce greenhouse gas emissions, the legal basis for its imposition already exists].

⁴⁹ Sunita Narain, Avantika Goswami, "Forest Carbon Offsets: What Rules Will Make It Work," *Centre for Science and Environment* (2022): 41.

⁵⁰ *Ibid.*

The value of carbon units varies and can reach significant levels. For instance, the IHS Market estimated the price of forest offsets to be USD 4/tCO_{2e}, but it could rise to USD 50/tCO_{2e}, while technological costs range from USD 17 to USD 180. McKinsey reported that the share of land and forest-based projects in the carbon credit market increased from 5% in 2010 to 40% in 2021.⁵¹ This value increase highlights the investment potential of carbon trading, making it attractive for various stakeholders, including those involved in money laundering activities.

In prosecuting money laundering, the government plays a critical role in proving that the defendant engaged in financial transactions involving illegal proceeds and attempted to conceal the illicit origins.⁵² Money launderers can invest illicit funds in emission reduction or absorption projects conducted by communities or private entities, ultimately owning the resulting carbon credits. Achieving greenhouse gas emission reductions through carbon trading is challenging without concurrent efforts in forest rehabilitation projects, renewable energy initiatives, and community-based alternative energy production.

The EU ETS, operational since 2005, is considered a well-established and robust carbon trading scheme. Despite its strengths, the EU ETS is still vulnerable to money laundering activities.⁵³ Approximately 300 reports of suspicious transactions are filed yearly, suggesting potential money laundering within the European carbon market.⁵⁴ In 2016, a French court prosecuted 12 individuals for carbon trading fraud involving transactions worth 5 million Euros, with 1.6 million Euros occurring in France and the remainder across other EU countries.⁵⁵ In Indonesia, the Financial Transaction Reports and Analysis Centre received 1,096 reports of suspicious financial transactions from the capital market sector,⁵⁶ indicating that similar reports could emerge from carbon trading transactions in the future.

Gaps in the certification systems for carbon credits also pose risks.⁵⁷ In 2015, German authorities arrested and prosecuted five Deutsche Bank employees for money laundering related to emission certificate transactions.⁵⁸ Another case in Alberta, Canada, saw the first prosecution of a business operator for providing false information about carbon offsets in the second half of 2023.⁵⁹ Criminal networks operate across various markets for diverse products, exploiting vulnerabilities within the carbon market.⁶⁰ Interpol has warned authorities to be vigilant of criminal activities targeting the global carbon market, valued at around USD 176 billion.⁶¹

⁵¹ *Ibid.*, 40.

⁵² Jerry W. Markham, Thomas Lee Hazen, Money Laundering Broker-Dealer Operations Under Securities and Commodities Law | December 2022, 1.

⁵³ Aude Mazoue, Multi-billion euro carbo-trading fraud trial opens in Paris (France24.com, 2016), <https://www.france24.com/en/20160503-france-trial-multi-billion-carbon-emissions-trading-fraud-opens-paris>, accessed April 05, 2024.

⁵⁴ *Ibid*

⁵⁵ Kai-D. Bussmann “Detecting Money Laundering in Emissions Trading: Final Report,” *Federal Environmental Agency*, (2020): 5.

⁵⁶ Laporan Transaksi Keuangan Mencurigakan sektor perbankan naik 48,8% [Banking Sector Suspicious Financial Transaction Report up 48.8%] (idnfinancials.com, 2023), <https://www.idnfinancials.com/id/news/45824/banks-suspicious-activity-reports-rose>, Accessed April 5, 2024

1. ⁵⁷ Matthew John, “A False Shade of Green: Criminal Contours of Carbon Trading,” LinkedIn, 2023.

⁵⁸ <https://www.linkedin.com/pulse/false-shade-green-criminal-contours-carbon-trading-matthew-john>

⁵⁹ Chris Arsenault, Alberta filed 1st ever charges against a carbon offset firm. Here's why they may not be the last (cbc.ca, 2023), <https://www.cbc.ca/news/canada/alberta-charges-carbon-offset-firm-1.6903889>. Accessed April 05, 2024.

⁶⁰ Regina Betz, et. al., *The Carbon Market Challenge*, Cambridge: Cambridge University Press, 2022, 59.

⁶¹ Ed King, Interpol warns of criminal focus on \$176 billion carbon market (climatechangenews.com, 2013) <https://www.climatechangenews.com/2013/08/05/interpol-warns-of-criminal-focus-on-176-billion->

The newly established Carbon Exchange in September 2023 also faces potential money laundering risks. In the placement stage of money laundering, illicit funds can be funneled into the Carbon Exchange by purchasing pollution allowances. These certificates can then be traded through a series of transactions using sub-accounts to obscure the link between the pollution allowances and the illegal proceeds (layering). Finally, the illicit funds are retrieved by selling the pollution allowances (integration).⁶²

A prominent issue in the developing carbon market is strengthening institutional frameworks and improving systems to detect and identify money laundering schemes.⁶³ The Indonesian Financial Transaction Reports and Analysis Centre (INTRAC) has established a detection system to identify and classify suspicious transactions as potential money laundering activities within the Carbon Exchange. Trading activities in the Carbon Exchange, overseen by the Exchange Authority and the Financial Services Authority (OJK), will be analyzed by INTRAC to determine the status of these suspicious transactions.

According to Presidential Regulation No. 98 of 2021 on the Implementation of Carbon Economic Value, Indonesia has set the Carbon Pricing at IDR 30,00 per kilogram of emissions, significantly lower than the carbon credit value reported by IHS Market. Despite the low price, it should not be used as a reason to overlook the potential for money laundering within the Indonesian Carbon Exchange. INTRAC must scrutinize transactions in both the primary Carbon Exchange market and secondary markets. Service providers must implement Know Your Customer (KYC) principles like stock trading to prevent money laundering. INTRAC can request transaction reports from the Carbon Exchange or suspicious financial transaction reports from financial service providers involved in the Carbon Exchange.⁶⁴ The number of suspicious financial transaction reports in the capital market statistics for 2024 may increase with the establishment of the Carbon Exchange.

The establishment of the Carbon Exchange should be welcomed as part of the government's efforts to meet the NDCs while maintaining a vigilant system to prevent potential money laundering in carbon trading. Like other financial markets, the carbon market carries risks of criminal exploitation due to the significant amounts of money involved, immature regulations, and a lack of oversight and transparency.⁶⁵ Unlike common crimes (such as manipulation, selling non-existent carbon credits, misleading or false claims, exploitation of regulatory loopholes in the carbon market, and securities or tax fraud), money laundering infiltrates the legal system by purchasing or investing in carbon units available in the exchange, secondary markets, or directly from entities involved in greenhouse gas emission absorption, storage, and reduction.

The development of carbon trading through the Carbon Exchange aligns to reduce greenhouse gas emissions by 29% domestically by 2030 and may reach 41% with international support,⁶⁶ as outlined in the NDC. Ensuring the integrity of carbon trading and the environment

carbon-market. Accessed April 05, 2024 King, Interpol warns of criminal focus on \$176 billion carbon market (climatechangenews.com, 2013)

⁶² Betz., *et. al.*, The Carbon Market, 59.

⁶³ Nadia Hanif, Anam Javaid, Noman Arshed, and Abdul Rafay, "Foreign Exploration of Immature Markets and Incidence of Money Laundering," *Journal of Money Laundering Control*, (2023). FDI has a mediating effect on ML through exports and CE. Though FDI has direct negative effect on ML, it is the gaps in institutional infrastructure which is causing ML via CO₂ and exports.

⁶⁴ Bruce Zagaris, "Int'l Environmental Enforcement and Financial Regulation." *International Enforcement Law Reporter*, vol. 37, no. 12, (2021): 452-454.

⁶⁵ Chicago 17th ed. "Carbon Trading Crime," *Global Environmental Law Annual 2013 (2013)*: 3-36.

⁶⁶ Indonesia Green Growth Program, Updated NDC Indonesia untuk masa depan yang tangguh iklim [Updated Indonesia's NDC for a climate-resilient future] (greengrowth.bappenas.go.id, 2023), <http://greengrowth.bappenas.go.id/updated-ndc-indonesia-untuk-masa-depan-yang-tangguh-iklim>, accessed April 05, 2024.

to meet these targets necessitates robust measures to prevent money laundering in carbon trading.

Conclusion

Based on this discussion, it can be concluded that carbon trading is an auxiliary mechanism utilized within the international Climate Change Regime. The European Union and China are examples of nations that have employed this method to control greenhouse gas emissions. Governments regulate emissions control by issuing pollution permits and allocating carbon rights, which can be traded on carbon exchange. The Carbon Exchange also trades carbon credits, issued based on the absorption or storage of greenhouse gas emissions through land-based projects, forestry, and renewable energy initiatives. The value of carbon units associated with these issued carbon credits varies and tends to increase, making them a profitable investment vehicle for financial gain and greenhouse gas emission reduction.

Although carbon trading effectively reduces emissions, it remains a supplementary mechanism in the broader effort to combat climate change. Market and environmental integrity must be maintained to ensure carbon trading achieves its intended goals. Moreover, a combination of various mechanisms and policies, including direct regulation and incentives for clean energy, is necessary to ensure sustainable and significant emission reductions. Carbon trading alone is insufficient to address all aspects of climate change; thus, integrating diverse strategies is crucial to achieving broader global climate targets.

Carbon trading has the potential for exploitation, including activities related to money laundering. Due to the open nature of the Carbon Exchange, various parties from anywhere can engage in buying and selling transactions. The potential for money laundering in carbon trading exists through purchasing carbon rights and carbon credits via the Carbon Exchange, funding projects aimed at emission reduction and absorption, and the theft of carbon units through registry systems or trading platforms. The Indonesian government has implemented Know Your Customer principles and Suspicious Financial Transaction Reports as preventive mechanisms, and Law No. 8 of 2010 on the Prevention and Eradication of Money Laundering as an enforcement mechanism. Establishing the Carbon Exchange should be welcomed as part of the government's efforts to meet Nationally Determined Contributions (NDC) while maintaining vigilance against potential money laundering activities in carbon trading.

References

- Aldy, Joseph E. "Evaluating Regulatory Performance: Learning from and Institutionalizing Retrospective Analysis of EPA Regulation," *Case Western Reserve Law Review* Vol. 70, (2020).
- Barnes, Richard. *Property Rights and Natural Resources*, Oxford: Hart Publishing, 2009.
- Betz, Regina et. al., *The Carbon Market Challenge*, Cambridge: Cambridge University Press, 2022.
- Boute, Anatole. Hao Zhang, "Fixing the Emissions Trading Scheme: Carbon Price Stability in the EU and China," *European Law Journal* 25, no. 3 (2019): 333-347.
- Bram, Deni *Hukum Perubahan Iklim: Perspektif Global dan Nasional [Climate Change Law: Global and National Perspectives]*, Malang: Setara Press, 2016.
- Brohe, Arnaud. Nick Eyre, Nicholas Howarth, *Carbon Markets: An International Business Guide*, London: Earthscan, 2009.
- Bussmann Kai-D. "Detecting Money Laundering in Emissions Trading: Final Report," Federal Environmental Agency, 2020.

- Calabresi, Guido. Douglas Melamed, "Property Rules, Liability Rules, And Inalienability: One View of The Cathedral," *Harvard Law Review*, Vol. 85, No.6, (1972).
- Carlson, Ann E." Designing Effective Climate Policy: Cap-And-Trade and Complementary Policies," *Harvard Journal on Legislation* Vol. 49, (2012).
- Chen, Ling "Are Emissions Trading Schemes a Pathway to Enhancing Transparency Under the Paris Agreement?" *Vermont Journal of Environmental Law Spring*, (2018).
- Chicago 17th ed. "Carbon Trading Crime," *Global Environmental Law Annual 2013*, (2013): 3-36.
- Arsenault, Chris. Alberta filed 1st ever charges against a carbon offset firm. Here's why they may not be the last. Accessed April 05, 2024. <https://www.cbc.ca/news/canada/alberta-charges-carbon-offset-firm-1.6903889>.
- Dales, J.H. *Pollution, Property & Prices: An Essay in Policy-Making and Economics*, Chentelham: Edward Elgar, 2002.
- Dari-Mattiacci, Giuseppe Josephine van Zeben,"Legal And Market Uncertainty In Market-Based Instruments: The Case Of The EU ETS," *New York University Environmental Law Journal* Vol. 19, (2012).
- Dissanayake, Sumali. Renuka Mahadevan, John Asafu-Adjaye, "Evaluating the Efficiency of Carbon Emissions Policies in a Large Emitting Developing Country," *Energy Policy* 136 (2020) 111080, 1. <https://doi.org/10.1016/j.enpol.2019.111080>.
- Dissou, Yazid. Lilia Karnizova, "Emissions Cap or Emissions Tax? A Multi-Sector Business Cycle Analysis," *Journal of Environmental Economics and Management* 79 (2016): 169–188.
- Eckersley, Robin "Soft Law, Politik Keras, dan Traktat Perubahan Iklim [Soft Law, Hard Politics, and Climate Change Treaties]" in Christian Reus-Smit, *Politik Hukum Internasional*, Malang: Nusa Media, 2015.
- Freeman, Jeremy. "Efficacy of Carbon Taxes and Recommendations for Cutting Carbon Emissions," *Houston Business and Tax Law Journal* 15, no. 2 (2015): 268-299.
- Freestone, David. Charlotte Streck, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen and Beyond*, Oxford: Oxford University Press, 2009.
- Indonesia Green Growth Program, Updated NDC Indonesia untuk masa depan yang tangguh iklim [Updated Indonesia's NDC for a climate-resilient future]. Accessed April 05, 2024. <http://greengrowth.bappenas.go.id/updated-ndc-indonesia-untuk-masa-depan-yang-tangguh-iklim>.
- Guo, Jingrong. Yue Xiang," Cost–benefit analysis of Gencos Market Trading with Carbon-Tax and Cap-and-Trade Policies," *Energy Reports* 8 (2022): 900–907.
- Hanif, Nadia. Anam Javaid, Noman Arshed, and Abdul Rafay," Foreign Exploration of Immature Markets and Incidence of Money Laundering," *Journal of Money Laundering Control*, (2023).
- <https://www.linkedin.com/pulse/false-shade-green-criminal-contours-carbon-trading-mathew-john>.
- Hu, Xu. Zhaojun Yang, Jun Sun, Yali Zhang," Carbon Tax or Cap-And-Trade: Which Is More Viable for Chinese Remanufacturing Industry?" *Journal of Cleaner Production* 243 (2020) 118606.
- Indonesian Constitutional Court, Undang-Undang Nomor 16 Tahun 2016 Tentang Pengesahan *Paris Agreement to The United Nations Framework Convention on Climate Change* [Paris approval of the United Nations Framework Convention on Climate Change].
- Indonesian Constitutional Court, Undang-Undang Nomor 4 Tahun 2023 tentang Pengembangan dan Penguatan Sektor Keuangan [P2SK Law of the Republic of Indonesia].

- Indonesian Constitutional Court, Undang-Undang Nomor 7 Tahun 2023 tentang Harmonisasi Peraturan Perpajakan. [review on Harmonization of Tax Regulations]
- Indonesian Constitutional Court, Peraturan Pemerintah (PP) Nomor 46 Tahun 2017 tentang Instrumen Ekonomi Lingkungan Hidup [Statute Book of 2017/No. 228, Supplement to Statute Book No.6134].
- Indonesian Constitutional Court, Peraturan Pemerintah (PP) Nomor 22 Tahun 2021 tentang Penyelenggaraan Perlindungan dan Pengelolaan Lingkungan Hidup [Statute Book of 2021 No.32, Supplement to Statute Book No. 6634].
- Indonesian Constitutional Court. Peraturan Presiden Nomor 98 Tahun 2021 tentang Penyelenggaraan Nilai Ekonomi Karbon untuk Pencapaian Target Kontribusi yang Ditetapkan secara Nasional dan Pengendalian Emisi Gas Rumah Kaca dalam Pembangunan Nasional [Statute Book of the Republic of Indonesia Year 2021 Number 249].
- Indonesian Constitutional Court, Otoritas Jasa Keuangan (OJK), Peraturan OJK Nomor 14 Tahun 2023 tentang Perdagangan Karbon melalui Bursa Karbon. [review on Carbon Trading through the Carbon Exchange].
- International Carbon Action Partnership, *Perdagangan Emisi Seluruh Dunia: Laporan Status ICAP 2021, ICAP 2022*.
- Interpol, *Guide to Carbon Trading Crime*, Interpol, 2013.
- Jackson, Eoin. "Climate Emergency Declarations and the Transition to a Sustainable Corporate Model - Justifying Emergency Measures to Create a Green Business Framework," *The King's Student Law Review*, Vol XII, Issue I (2022): 30-57.
- Jackson Hsu, Shi-Ling "Carbon Taxes and Economic Inequality," *Harvard Law & Policy Review* 15, no. 2 (2021): 551-570.
- Jayaraman, Thiagarajan. "The Paris Agreement on Climate Change: Background, Analysis, and Implications," *Researchgate*, 2016, <https://www.researchgate.net/publication/289470031>.
- Janghu, Shubham. Armin Rosencranz, Fighting India's War on Carbon with an Emissions Trading Program, *5 Nat'l L.U. Delhi Stud. L.J.* 57 (2018): pp 57-70.
- John, Matthew. "A False Shade of Green: Criminal Contours of Carbon Trading," LinkedIn, 2023.
- Kaza, Greg. "Carbon Trading and International Trade," *Regulation* 42, no. 3 (2019): 52-53.
- King, Ed. Interpol warns of criminal focus on \$176 billion carbon market. Accessed April 05, 2024. <https://www.climatechangenews.com/2013/08/05/interpol-warns-of-criminal-focus-on-176-billion-carbon-market>.
- Laporan Transaksi Keuangan Mencurigakan sektor perbankan naik 48,8% [Banking Sector Suspicious Financial Transaction Report up 48.8%]. Accessed April 05, 2024. <https://www.idnfinancials.com/id/news/45824/banks-suspicious-activity-reports-rose>.
- Lin, Albert C. "Carbon Dioxide Removal after Paris," *Ecology Law Quarterly* 45, no. 3 (2018): 533-582.
- MacPherson, C.A.B. *Pemikiran Dasar Tentang Hak Milik* [Basic Thoughts on Property Rights], Jakarta: Yayasan LBH Indonesia, 1989.
- Mariane, Irene. *Kearifan Lokal: Pengelolaan Hutan Adat*, [Local Wisdom: Customary Forest Management], Jakarta: Rajawali Press, 2014.
- Marzuki, Peter Mahmud. *Pengantar Ilmu Hukum* [Introduction to Law], Jakarta: Prenada Kencana Media, 2008.
- Markham Jerry W. Thomas Lee Hazen, Money Laundering Broker-Dealer Operations Under Securities and Commodities Law, December 2022.
- Mertokusumo, Sudikno. *Mengenal Hukum* [Getting to Know the Law], Yogyakarta: Liberty, 1999.

- Mazoue, Aude. Multi-billion euro carbo-trading fraud trial opens in Paris. Accessed April 05, 2024. <https://www.france24.com/en/20160503-france-trial-multi-billion-carbon-emissions-trading-fraud-opens-paris>.
- Narain Sunita, Avantika Goswami, "Forest Carbon Offsets: What Rules Will Make It Work," *Centre for Science and Environment* (2022). Stable URL: <https://www.jstor.org/stable/resrep42522.8>.
- Purbacaraka, Purnadi Soerjono Soekanto, *Sendi-sendu Ilmu Hukum dan Tata Hukum [Joints of Law and Legal Governance]*, Bandung: Alumni 1979.
- Robbins, Rebecca "A Toxic Relationship: Proposed Policy Solutions to Mitigate Climate Change's Effects on Freshwater Harmful Algal Blooms," *Texas Environmental Law Journal Spring*, Vol. 51, (2021).
- Schmalensee, Richard. Robert N. Stavins," Lessons Learned from Three Decades of Experience with Cap and Trade," *Review of Environmental Economics and Policy*, volume 11, issue 1, Winter (2017): pp. 59–79. doi:10.1093/reep/rew017.
- Shavell, Steven. *Foundations Of Economic Analysis of Law*, Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 2004.
- Stavins, Robert N "Cap-and-Trade or Carbon Tax," *Environmental Law Institute*, 2008.
- Prodjodikoro, Wirjono. *Hukum Perdata Tentang Hak Atas Benda [Civil Law on Rights to Objects]*, Jakarta: Intermasa, 1986.
- Tiseo, Ian. Emisi karbon dioksida global tahun 1940-2023 [Global carbon dioxide emissions 1940-2023]. Accessed April 18, 2024. <https://www-statista-com.translate.google.com/statistics/276629/global-co2-emissions/>
- Wibisana, Muhamad Ramadan Andri Gunawan *Law and Economic Analysis of Precautionary Principle*, Maastricht: Universitaire Pers Maastricht, 2008.
- Yustiavandana, Ivan. Arman Nefi, Adiwarman, *Tindak Pidana Pencucian di Pasar Modal [Crime of Laundering in the Capital Market]*, Jakarta: Ghalia Indonesia, 2010.
- Zagaris, Bruce "Int'l Environmental Enforcement and Financial Regulation." *International Enforcement Law Reporter*, vol. 37, no. 12, (2021):452-454.