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Indonesia's Carbon Trading as a Decarbonization Effort in Achieving the Enhanced Nationally Determined Contribution (ENDC) Target

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Abstract

Carbon trading is one of the instruments in efforts to reduce emissions and encourage decarbonization. As a country with significant emissions, Indonesia contributes to global emissions reductions through carbon trading mechanisms conducted directly or through the Indonesia Carbon Market (IDXCarbon). However, carbon trading in Indonesia faces challenges such as lack of participation and issues that influence businesses decision to participate. This study aims to analyze the causes of low carbon trading in Indonesia and evaluate companies' efforts to reduce emissions, using empirical normative research methods, as well as qualitative data analysis with inductive methods. The results show that Indonesia's carbon trading is currently mandatory for the energy sector - power generation subsector, especially coal-fired power plants as the largest emission-contributing sector. While other sectors are still implementing carbon trading voluntarily. However, the obligation has not been followed by

strict sanctions such as fines, but only administrative sanctions which are considered less effective. Therefore, there is a need for additional arrangements regarding fines. In addition, former President Joko Widodo's statement at the inauguration of IDXCarbon that Indonesia's carbon trading potential through the carbon exchange could reach Rp3,000 trillion has not been optimized, as evidenced by the low frequency of transactions and limited market participation. On the other hand, carbon trading has also not become the main choice for listed companies as a form of decarbonization, but only as an additional option to reduce their emissions.

KEYWORDS *Carbon Trading, Decarbonization, Enhanced Nationally Determined Contribution (ENDC)*

I. Introduction

The current rise in the Earth's temperature indicates extreme climate change from high Greenhouse Gas (**"GHG"**) emissions from human activities.[1] According to data from the European Commission, the volume of GHG emissions in 2022 was the highest ever recorded at that time, at 1.24 giga tCO_2e and a 10% increase over the previous year.[2] In addition, according to the Copernicus Change Service (C3S), the climate agency of the European Union, the Earth's temperature in 2023 increased by 0.17°C compared to 2016, which was once again recorded as the hottest year, and

[1] Aryn Baker, "2023 Was The Hottest Year Ever and 2024 May Be Even Worse," TIME, January 12, 2024, https://time.com/6554830/2023-hottest-year-ever/; United Nations, "Penyebab Dan Dampak Perubahan Iklim | Perserikatan Bangsa - Bangsa Di Indonesia," March 18, 2022, https://indonesia.un.org/id/175273-penyebab-dan-dampak-perubahan-iklim.

[2] Adi Ahdiat, "Emisi Gas Rumah Kaca Indonesia Meningkat Pada 2022, Tembus Rekor Baru," databoks, September 29, 2023, https://databoks.katadata.co.id/lingkungan/statistik/8d993dfb8c5e35c/emisi-gas-rumah-kaca-indonesia-meningkat-pada-2022-tembus-rekor-baru.

by 0.60°C compared to the average temperature from 1991-2020.[3] Increased GHG emissions lead to various negative impacts, such as rising temperatures that trigger natural disasters, food and water scarcity that can threaten the quality of human health and exacerbate poverty.[4] This has led to international agreements, such as the Kyoto Protocol and the Paris Agreement.

As one of the countries that ratified the Paris Agreement, Indonesia shows its commitment through the Nationally Determined Contribution (NDC) to support the global agreement to limit the increase in earth's temperature below 1.5°C - 2°C. Currently, Indonesia refers to the Enhanced Nationally Determined Contribution (**"ENDC"**) commitment to reduce GHG emissions in 2030 by 31.89% with national capacity and 43.20% with international support, compared to the business as usual scenario.[5] To achieve this target, the Government issued Presidential Regulation Number 98 of 2021 on the Implementation of Carbon Economic Value for Achieving the Nationally Determined Contribution Target and Controlling Greenhouse Gas Emissions in National Development (**"PR 98/2021"**) as the legal basis for reducing GHG emissions, increasing climate resilience, and the basis for implementing carbon economic value in Indonesia.

In PR 98/2021, efforts to achieve ENDC targets are carried out through climate change adaptation and mitigation actions. In terms of climate change adaptation actions, there are 3 main focuses in ENDC, namely economic resilience, social and livelihood sources, and ecosystems and landscapes. In terms of climate change mitigation actions, there are 5

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3 Copernicus, "2023 Is The Hottest Year On Record, With Global Temperatures Close To The 1.5°C Limit," January 9, 2024, https://climate.copernicus.eu/copernicus-2023-hottest-year-record.

4 Tim CNBC Indonesia, "Apa Itu Perubahan Iklim, Penyebab, Dampak & Cara Mengatasinya," CNBC Indonesia, July 4, 2022, https://www.cnbcindonesia.com/tech/20220704142800-37-352764/apa-itu-perubahan-iklim-penyebab-dampak-cara-mengatasinya.

5 Kementerian Lingkungan Hidup dan Kehutanan Pejabat Pengelola Informasi dan Dokumentasi, "Enhanced NDC: Komitmen Indonesia Untuk Makin Berkontribusi Dalam Menjaga Suhu Global," n.d., https://ppid.menlhk.go.id/berita/siaran-pers/6836/enhanced-ndc-komitmen-indonesia-untuk-makin-berkontribusi-dalam-menjaga-suhu-global.

sectors that are the focus of emission reduction, namely forestry, energy, waste, agriculture, and Industrial Process and Production Use (IPPU).[6] As an effort to mitigate climate change, one of the schemes that Indonesia uses is carbon trading as a market-based mechanism to reduce GHG emissions through buying and selling carbon units. Carbon units, also known as carbon credits, are certificates or technical agreements that represent 1 tCO2e of GHG emission reduction and are recorded in the National Registry System for Climate Change Control (*Sistem Registri Nasional Pengendalian Perubahan Iklim* - **"SRN PPI"**). This carbon unit covers 6 types of GHGs, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).[7] These carbon units can be traded by companies, individuals or legal entities running nature conservation or forest conservation projects.[8]

In its application, Indonesia's carbon trading is divided into emission trading and GHG emission offsets. Emission trading is a type of carbon trading that is mandatory for businesses that have an Emission Threshold set by the government. This trade is also known as Compliance Carbon Market (CCM). Meanwhile, GHG emission offsetting is the offsetting of GHG emissions by undertaking projects that reduce, sequester or prevent the release of GHG emissions elsewhere. Unlike emissions trading, which is a CCM, GHG emission offsets are a Voluntary Carbon Market (VCM) because GHG emission offsets are carried out by businesses voluntarily or with their own initiative to offset GHG emissions. [9]Currently, the sector

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[6] Indonesia Green Growth Program, "Updated NDC Indonesia Untuk Masa Depan Yang Tangguh Iklim," September 23, 2021, http://greengrowth.bappenas.go.id/updated-ndc-indonesia-untuk-masa-depan-yang-tangguh-iklim/.

[7] Nikmah Mentari, Ilham Dwi Rafiqi, and Tiara Zein, "Implementasi Pengaturan Perdagangan Karbon Di Indonesia Dalam Perspektif Investasi Hijau Dan Konstitusi Ekonomi," *JATISWARA* 39, no. 3 (November 2024): 283–94, https://jatiswara.unram.ac.id/index.php/js/article/view/710.

[8] Valiant Alfarizy et al., "Mekanisme Hukum: Perdagangan Karbon Melalui Bursa Karbon Di Indonesia," *UNES Law Review* 6, no. 2 (December 2023): 7354–65, https://doi.org/https://doi.org/10.31933/unesrev.v6i2.

[9] Suci Ariyanti, Suwarno Abadi, and Taufiqurrahman Taufiqurrahman, "Implementasi Perdagangan Karbon Di Indonesia Pasca Terbitnya POJK Nomor 14 Tahun 2023 Tentang Bursa Karbon," *Law and Humanity* 2, no. 1 (April 2024): 18–39, https://doi.org/10.37504/lh.v2i1.606.

that has been set a GHG Emission Ceiling and is required in carbon trading is the energy sector as the largest emitting sector.[10] Other sectors outside the energy sector can conduct GHG emission offset carbon trading voluntarily.

Both types of carbon trading can be conducted in two ways, namely through carbon exchanges and direct trading. For carbon exchange, President Joko Widodo officially launched Indonesia Carbon Exchange, IDXCarbon, as a place to buy and sell carbon units on September 26, 2023.[11] While direct trading involves sellers and buyers of carbon units conducted outside the carbon exchange. At the launch of IDXCarbon, former President Joko Widodo said that Indonesia's carbon trading potential through the carbon exchange could reach Rp3,000 trillion.[12] However, referring to the monthly data released by IDXCarbon, the accumulated value of carbon trading transactions for one year is still very far from this calculation.[13] The monthly trading frequency is also very low, with an average of 7 transactions. In fact, there are around 81 businesses that have registered to trade on IDXCarbon as of September 26, 2024.[14] OJK also recognizes that transactions on IDXCarbon are still minimal and

[10] Kementerian Energi dan Sumber Daya Mineral, "Menteri ESDM Luncurkan Perdagangan Karbon Subsektor Pembangkit Listrik," February 22, 2023, https://www.esdm.go.id/id/media-center/arsip-berita/menteri-esdm-luncurkan-perdagangan-karbon-subsektor-pembangkit-listrik.

[11] Indonesia Stock Exchange, "Bursa Karbon Indonesia (IDXCarbon) Resmi Diluncurkan," September 26, 2023, https://www.idx.co.id/id/berita/siaran-pers/2016.

[12] CNN Indonesia, "Jokowi Sebut Potensi Bursa Karbon RI Bisa Capai Rp3.000 T," September 26, 2023, https://www.cnnindonesia.com/ekonomi/20230926112939-532-1003799/jokowi-sebut-potensi-bursa-karbon-ri-bisa-capai-rp3000-t.

[13] Zefanya Aprilia, "Duh! Perdagangan Bursa Karbon Di RI Masih Jauh Di Bawah Ekspektasi," CNBC Indonesia, July 4, 2024, https://www.cnbcindonesia.com/market/20240704173540-17-551871/duh-perdagangan-bursa-karbon-di-ri-masih-jauh-di-bawah-ekspektasi; Dian Fath Risalah, "Jauh Dari Potensi, Akumulasi Transaksi Bursa Karbon Baru Mencapai Rp 36,79 Miliar," Republika, July 8, 2024, https://esgnow.republika.co.id/berita/sgbb0w490/jauh-dari-potensi-akumulasi-transaksi-bursa-karbon-baru-mencapai-rp-3679-miliar.

[14] IDXCarbon, "IDXCarbon Monthly Report September 2024," September 2024, https://www.idxcarbon.co.id/document/share/71/7522c981-1e89-42fa-bf0f-043ce205a745.

is coordinating with relevant ministries and institutions to create incentive and disincentive policies to increase supply and demand on IDXCarbon.[15]

Carbon trading is one of the new strategies adopted by Indonesia as a global effort to address climate change. The significant difference between estimated and realized trade value suggests that Indonesia's carbon trading has not been optimal due to low market participation. At the same time, there are other OJK provisions that require publicly listed companies in Indonesia to reduce GHG emissions and report them annually as one of the fulfillments of Environmental, Social, and Governance (ESG) standards. Therefore, this paper focuses on analyzing the causes of suboptimal carbon trading in Indonesia as a decarbonization effort in order to meet the ENDC target.

This research uses normative-empirical legal research. Normative-empirical research is a type of research that examines legal norms and their implementation to see whether or not they are in accordance with applicable positive law.[16] The type of data used in this research is secondary data supported by primary data obtained through observation. Secondary data used includes: 1) primary legal materials, which include laws and regulations regarding carbon trading in Indonesia; 2) secondary legal materials, which consist of books, journals, legal literature, articles, related to the regulation and implementation of carbon trading in Indonesia; and 3) tertiary legal materials. The data collection technique used is a literature study, and the study analysis uses qualitative analysis with inductive method.

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[15] Rizqi Rajendra, "OJK Akui Transaksi Bursa Karbon Masih Minim, Ini Strateginya," Market Bisnis, March 19, 2024, https://market.bisnis.com/read/20240319/7/1750851/ojk-akui-transaksi-bursa-karbon-masih-minim-ini-strateginya; Amara Zahra, "Perdagangan Karbon Masih Sulit Untuk Pelaku Usaha, Ini Sebabnya," IDNTimes, March 20, 2024, https://www.idntimes.com/business/economy/amara-zahra/perdagangan-karbon-masih-sulit-untuk-pelaku-usaha-ini-sebabnya?page=all.

[16] Abdul Kadir Muhammad, Hukum Dan Penelitian Hukum (Bandung: PT Citra Aditya Bakti, 2004). 134.

At the launch of IDXCarbon, former President Joko Widodo said that the existence of a carbon exchange can be a concrete step towards achieving Net Zero Emission ("**NZE**") by 2060 in Indonesia.[17] The presence of IDXCarbon in Indonesia's carbon trading system is expected to accelerate the achievement of NZE through a transparent market to ensure information disclosure to the public, facilitate access for businesses to sell and buy carbon trading products, so that transactions can be carried out at affordable costs. These three things cannot be monitored if transactions take place between business actors without intermediaries.[18]

II. Indonesia's Carbon Trading Arrangements and Mechanisms

Starting from the Paris Agreement, Indonesia finally showed its commitment to organize carbon trading through PR 98/2021 which regulates the implementation of carbon economic value as an effort to achieve the NDC target. Furthermore, the mechanism and technicalities of Indonesia's carbon trading are regulated in the Regulation of the Minister of Environment and Forestry Number 21 of 2022 on the Implementation of Carbon Economic Value ("**MoEF 21/2022**"). MoEF 21/2022 regulates the procedures for implementing carbon trading, starting from domestic and foreign carbon trading, types, procedures, cross-sector trading, carbon exchanges, measurement, reporting, and verification of carbon trading implementation, organizing the SRN PPI, issuing carbon unit products, managing funds for carbon trading, to monitor and evaluate the implementation of carbon trading.

[17] Lukman Nur Hakim, "Ada Bursa Karbon, MIND ID: Langkah Tepat Percepat Dekarbonisasi," Ekonomi Bisnis, October 5, 2023, https://ekonomi.bisnis.com/read/20240723/44/1784586/esdm-146-pltu-ikut-perdagangan-karbon-di-2024-naik-dari-2023.

[18] IDXCarbon, "Setting Your Sail on The Indonesia Carbon Trading Ecosystem," n.d., https://idxcarbon.co.id/id.

Based on Article 5 paragraph (1) of the Regulation of the MoEF 21/2022, carbon trading in Indonesia is divided into 2, namely emission trading and GHG emission offsets:

a. Emissions trading

Emission trading is a type of carbon trading between businesses that have emissions that exceed the specified Emission Cap.[19] Emission trading is a type of carbon trading that must be followed by certain sectors that have been determined by the government and have Emission Cap. In emissions trading, the relevant minister will determine the Technical Approval of GHG Emission Limits for Business Actors (*Persetujuan Teknis Batas Atas Emisi - Pelaku Usaha* - **"PTBAE-PU"**)[20] or the limit of GHG emissions that can be released by business actors during its period. At the end of the period, business actors are required to measure actual emissions and prepare a report on the implementation of PTBAE-PU to calculate the remaining GHG emission ceiling. In this case, there are two conditions. First, if the GHG emissions released from the company's operational activities exceed the stipulated PTBAE-PU, the business shall purchase carbon units from other PTBAE-PU owners who have remaining PTBAE-PU. Second, if the GHG emissions released are below the PTBAE-PU, the remaining unused GHG emission limit can be traded, stored for 2 years, or submitted for SPE-GRK issuance. Every emission trade carried out by business actors must be recorded and reported in the SRN PPI. The recording and reporting includes the issuance, transfer, and use of PTBAE-PU as well as verification results by verificators.

Currently, the required sector is the energy sector - power generation sub sector based on the Regulation of the Minister of Energy

[19] According to Article 1 Point 13 of PR 98/2021, the emissions cap is the highest level of GHG emissions set for a specific period; Article 1 Point 23 of Regulation of the MoEF 21/2022.

[20] According to Article 1 Point 17 of Regulation of the Minister of Energy and Mineral Resources Number 16 of 2022 on The Procedures for Implementing the Carbon Economic Value in the Power Generation Subsector, PTBAE-PU is the determination of emission quotas granted to business actors to emit GHG within a certain period of time stated in tons of carbon dioxide equivalent.

and Mineral Resources Number 16 of 2022 on The Procedures for Implementing the Carbon Economic Value in the Power Generation Subsector (**"MEMR 16/2022"**). This obligation is divided into several phases: (1) the first phase, which applies for the period 2023 to 2024; (2) the second phase, which applies for the period 2025 to 2027; and (3) the third phase, which applies for the period 2028 to 2030.[21] The first phase, which is currently in effect, is set for coal-fired power plants as the largest emitter in Indonesia.[22]

Based on information from the Ministry of Energy and Mineral Resources, there are 99 coal-fired power plants participating in carbon trading in 2023, with a distribution of 55 units from the State Electricity Company (*Perusahaan Listrik Negara* - PLN) Group and 44 units from Independent Power Producer (IPP).[23] These 99 coal-fired power plants units are coal-fired power plants with installed capacity above 100 megawatts. The value of carbon trading transactions from the 99 coal-fired power plants units was recorded at Rp84.14 billion with total carbon unit sales of 7.1 million tCO_2e.[24] Furthermore, in 2024, there are an additional 47 coal-fired power plants with an installed capacity of 50 megawatts that are required to participate in carbon trading. To date, there are 146 coal-fired power plants that have participated in carbon trading.[25]

b. *Offset* GHG Emissions

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[21] Article 4 Paragraph (3) of Regulation of the MEMR 16/2022.

[22] Climate Transparency Organization, "Indonesia Climate Transparency Report: Comparing G20 Climate Action," 2022, https://www.climate-transparency.org/wp-content/uploads/2022/10/CT2022-Indonesia-Web.pdf.

[23] Ministry of Energy and Mineral Resources, "99 Unit PLTU Ditargetkan Ikuti Perdagangan Karbon Tahun Ini," March 13, 2023, https://www.esdm.go.id/en/berita-unit/directorate-general-of-electricity/99-unit-pltu-ditargetkan-ikuti-perdagangan-karbon-tahun-ini.

[24] Kementerian Energi dan Sumber Daya Mineral, "Transaksi Perdagangan Karbon Tahun 2023 Capai Rp84 Miliar," July 23, 2024, https://esdm.go.id/id/media-center/arsip-berita/transaksi-perdagangan-karbon-tahun-2023-capai-rp84-miliar.

[25] Lukman Nur Hakim, "ESDM: 146 PLTU Ikut Perdagangan Karbon Di 2024, Naik Dari 2023," Kementerian Energi dan Sumber Daya Mineral, July 23, 2024, https://ekonomi.bisnis.com/read/20240723/44/1784586/esdm-146-pltu-ikut-perdagangan-karbon-di-2024-naik-dari-2023.

Offset GHG emissions are reductions in GHG emissions made by businesses and/or activities to compensate for emissions made elsewhere.[26] *Offset* GHG emissions are achieved by implementing a climate change mitigation project. With the development of technologies that can be used to address climate change, GHG emission offset trading projects are divided into two categories: Nature Based Solutions (NBS) and Technology Based Solutions (TBS). NBS is a method of reducing GHG emissions by utilizing the power of nature and ecosystems to absorb or offset GHG emissions, such as through planting new forests or conserving and restoring peatlands and mangrove forests.[27] On the other hand, GHG emission reduction projects using TBS employ technology to reduce GHG emissions, such as transitioning to renewable energy or switching from fossil fuels to biomass.[28] GHG emission reduction projects utilizing the TBS mechanism can be found in projects listed on IDXCarbon, including: (1) Lahendong Unit 5 and Unit 6 Project implemented by PT Pertamina Geothermal Energy Tbk; (2) Construction of a New Natural Gas-Fired Power Plant Block 3 implemented by Pembangkit Jawa Bali Muara Karang; and (3) Operation of a mini-hydro power plant managed by Pembangkit Listrik Tenaga Minihidro Gunung Wugul.[29]

In climate mitigation action projects, both NBS and TBS systems, measurements and calculations of GHG emission reduction achievements must be carried out using GHG emission *baselines*,[30] and verified by an authorized verificator so that tradable carbon units, namely Greenhouse Gas Emission Reduction Certificates (*Sertifikat Pengurangan Emisi - Gas*

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[26] Article 1 Point 14 of Regulation of the MoEF 21/2022.

[27] Asep S. Adhikerana, "Nature-Based Solutions Untuk Perubahan Iklim," EcoNusantara, February 16, 2022, https://econusantara.org/nature-based-solutions-untuk-perubahan-iklim/.

[28] Senken, "Understanding Nature Carbon Credits," n.d., https://www.senken.io/academy/understanding-carbon-credits.

[29] Abbas, "Strategi Meramaikan Bursa Karbon Indonesia," CakrawalaToday, August 26, 2024, https://cakrawalatoday.com/2024/08/26/strategi-meramaikan-bursa-karbon-indonesia/.

[30] According to Article 1 Point 15 of Regulation of the MoEF 21/2022, GHG emissions baseline is an estimate of GHG emission levels and projections in sectors or activities that have been identified within a specified time frame without policy and/or mitigation technology intervention.

Rumah Kaca - "**SPE-GRK**")[31], can be issued. As a result, businesses seeking to offset their GHG emissions can purchase SPE-GRK from the project developers. Additionally, businesses are required to prepare a Mitigation Action Plan Document (*Dokumen Rencana Aksi Mitigasi* - DRAM), a validation report, a report on the implementation of climate change mitigation actions, and a verification report, all of which must be recorded in the SRN PPI.[32]

III. Indonesia's Carbon Trading Arrangements and Mechanisms

Under Article 54 Paragraph (1) of PR 98/2021 and Article 5 Paragraph (2) of Regulation of the MoEF 21/2022, carbon trading may be conducted through carbon exchanges and/or direct trading. Following these regulations, the government accelerated the implementation of carbon trading to mitigate climate change through the enactment of Law Number 4 of 2023 on the Development and Strengthening of the Financial Sector, which mandates the Financial Services Authority (*Otoritas Jasa Keuangan* - "**OJK**") as the regulator and supervisor of carbon trading on carbon exchanges. OJK subsequently issued Regulation of the Financial Services Authority Number 14 of 2023 on Carbon Trading through Carbon Exchanges ("**OJK Regulation 14/2023**") as the legal framework for Indonesia's carbon exchanges, covering rules on carbon trading requirements through carbon exchanges; the operation of carbon exchanges; the executive, operational, and internal control structures; supervision of carbon exchanges; licensing requirements and procedures,

[31] According to Article 1 Point 18 of Regulation of the MoEF 21/2022, SPE-GRK is a document that serves as proof of emission reductions by businesses and/or activities that have undergone measurement, reporting, and verification, and are recorded in the National Climate Change Control Registry System in the form of a number and/or registry code.

[32] Regulation of the MoEF 21/2022.

work plans and annual budgets, as well as reporting from carbon exchange operators. All operational and technical provisions of the carbon exchange are regulated in OJK Regulation 14/2023. Furthermore, Article 4 Paragraph (1) of OJK Regulation 14/2023 states that parties authorized to conduct business activities as a carbon exchange are market operators that have obtained a business license as a carbon exchange operator. Currently, the entity that has obtained such a license and operates as the carbon exchange in Indonesia is IDXCarbon, managed by PT Bursa Efek Indonesia. With the establishment of IDXCarbon, businesses can conduct transparent and trustworthy carbon unit transactions through a platform supervised by the OJK, thereby supporting the effective achievement of ENDC targets.

Former President Joko Widodo once said in a speech that Indonesia's carbon trading has great potential, which could reach Rp3,000 trillion.[33] However, transactions on IDXCarbon are actually very rare. According to monthly data, the largest transaction ever recorded on IDXCarbon was during the launch of IDXCarbon in September 2023, amounting to Rp29.2 billion with a trading volume of 459.953 tCO_2e.[34] These transactions were dominated by PT Pertamina Geothermal Energy, PT Bank Mandiri, PT BNI Sekuritas, PT BRI Danareksa Sekuritas, PT Pamapersada Nusantara, PT Pelita Air Service, PT Pertamina Hulu Energi, and PT Pertamina Patra Niaga.[35] However, no further transactions occurred until October 2023. The cumulative data for transactions in 2023 recorded 494,254 tCO_2e sold from 47 transactions with a total

[33] MetroTVNews, "Potensi Besar Carbon Trading Di Indonesia," May 13, 2024, https://www.metrotvnews.com/play/N9nCn16D-potensi-besar-carbon-trading-di-indonesia.

[34] Muhammad Khadafi, "Setelah Dibuka Jokowi, Transaksi Bursa Karbon Kok Sepi?," CNBC Indonesia, October 5, 2023, https://www.cnbcindonesia.com/market/20231005151441-17-478206/setelah-dibuka-jokowi-transaksi-bursa-karbon-kok-sepi.

[35] Indonesia Stock Exchange, "Bursa Karbon Indonesia (IDXCarbon) Resmi Diluncurkan," September 26, 2023, https://www.idx.co.id/id/berita/siaran-pers/2016.

transaction value of Rp30.9 billion.[36] The transaction data for 2024 is as follows:

TABLE 1. IDXCarbon Transaction Data in 2024

Timeframe	Volume of Carbon Unit Sold	Transaction Value	Trading Frequency
January 2024	7.656 tCO_2e	Rp453,2 million	7 transactions
February 2024	-	-	-
March 2024	70.046 tCO_2e	Rp3,9 billion	2 transactions
April 2024	108 tCO_2e	Rp6,3 million	4 transactions
May 2024	36.362 tCO_2e	Rp1,46 billion	17 transactions
June 2024	313 tCO_2e	Rp19,2 million	4 transactions
July 2024	4.801 tCO_2e	Rp247,6 million	11 transactions
August 2024	177 tCO_2e	Rp10,4 million	9 transactions
September 2024	176 tCO_2e	Rp10,7 million	4 transactions

Sources: IDXCarbon[37]

[36] IDXCarbon, "IDXCarbon Monthly Report Volume 1, January 2024," January 2024, https://www.idxcarbon.co.id/document/share/52/ae3f4af3-e4ef-4479-8257-20ae66e6995e.

[37] IDXCarbon, "IDXCarbon Monthly Report Volume 1, January 2024," January 2024, https://www.idxcarbon.co.id/document/share/52/ae3f4af3-e4ef-4479-8257-20ae66e6995e; IDXCarbon, "IDXCarbon Monthly Report Volume 2, February 2024," February 2024, https://www.idxcarbon.co.id/document/share/54/dfb9f1b5-6880-4b60-b6ea-e0820ead374f; IDXCarbon, "IDXCarbon Monthly Report Volume 3, March 2024," March 2024, https://www.idxcarbon.co.id/document/share/57/ff19dc18-9f96-422c-ae09-d65708ddb5c6; IDXCarbon, "IDXCarbon Monthly Report Volume 4, April 2024," April 2024, https://www.idxcarbon.co.id/document/share/59/4013bb8b-95d5-48b9-b53c-2c433bff9918; IDXCarbon, "IDXCarbon Monthly Report May 2024," May 2024, https://www.idxcarbon.co.id/document/share/63/ed08b7f4-8427-461f-b073-43889e2c68da;

Based on the data above, when accumulated, the value of carbon trading transactions up to September 2024 was recorded at Rp37.06 billion. This figure is still very far from the expected target of Rp3,000 trillion. When calculated, the average trading frequency from the start of carbon trading until now is only 7 transactions per month. This low trading frequency may be due to the low level of activity among businesses in carbon trading.

This can be attributed to two factors: first, IDXCarbon has not yet established an ideal market, and second, businesses have alternative options for reducing greenhouse gas emissions besides carbon trading. Although still far from expectations, Indonesia's carbon trading development is progressing well compared to other countries. The transaction volume on IDXCarbon is several times higher than that of the Malaysian carbon exchange, which was launched nine months earlier, and the Japanese carbon exchange, which was inaugurated around the same time as Indonesia on September 20, 2023.[38] However, there are several improvements that need to be made to encourage more active participation from businesses in carbon trading transactions.

1. IDXCarbon as an ideal market

Based on Ehrenberg's definition of a market, there are three main elements that form a market and are interrelated, namely: 1) sellers and

IDXCarbon, "IDXCarbon Monthly Report June 2024," June 2024, https://www.idxcarbon.co.id/document/share/64/59b63385-5eb8-4e0c-9120-9cb52dbc42d5; IDXCarbon, "IDXCarbon Monthly Report July 2024," July 2024, https://www.idxcarbon.co.id/document/share/67/ea9cd68d-ebd1-4b9b-94e2-3b39fbff37f9; IDXCarbon, "IDXCarbon Monthly Report August 2024," August 2024, https://www.idxcarbon.co.id/document/share/68/2cea4a16-2f05-4cd9-a5bd-cbfcd6ff9f2f; IDXCarbon, "IDXCarbon Monthly Report September 2024," September 2024, https://www.idxcarbon.co.id/document/share/71/7522c981-1e89-42fa-bf0f-043ce205a745.

[38] Nur Hana Putri Nabila, "Setahun Didirikan, Transaksi Bursa Karbon Indonesia Lampaui Jepang," katadata, October 3, 2024, https://katadata.co.id/ekonomi-hijau/investasi-hijau/66fe7ad4e8125/setahun-didirikan-transaksi-bursa-karbon-indonesia-lampaui-jepang; Zefanya Aprilia, "OJK Bantah Perdagangan Bursa Karbon Sepi," CNBC Indonesia, July 22, 2024, https://www.cnbcindonesia.com/market/20240722171314-17-556712/ojk-bantah-perdagangan-bursa-karbon-sepi.

buyers; 2) the market; and 3) products.[39] Sellers and buyers as market participants will not be interested in taking part if the market or the products offered do not exist or are not of good quality. Similarly, a market will not function effectively if there are few participants and the products being traded are of poor quality.[40] Considering the interdependence of these three elements, the market and the product are crucial for enhancing market participation. To investigate whether IDXCarbon can increase market participation, a comprehensive analysis from two perspectives is required: a) the carbon market mechanism; and b) the products involved in carbon trading.

a. Carbon Market Mechanisms in Indonesia

The completeness of components and sustainability of the carbon market can be studied using market microstructure theory to analyze financial markets and how they work. According to the National Bureau of Economic Research (NBER), market microstructure focuses on theoretical, empirical, and experimental research on securities markets, thereby encouraging business actors and portfolio managers to participate in the market.[41] In market microstructure, there are three important elements that can influence product value, namely price discovery, volatility, and liquidity, which are necessary to create a well-functioning market.[42] Price discovery is formed through market volatility projections, where a liquid market is needed to determine the level of volatility.[43]

First, price discovery is a process carried out by buyers and sellers, either explicitly or implicitly, to determine a fair price for a product.[44] The

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[39] Ronald G. Ehrenberg and Robert S. Smith, Modern Labor Economics: Theory And Public Policy (New York: Pearson Education, Inc, 2003), 39

[40] *Ibid.*

[41] Quantitative Brokers, "What Is Market Microstructure?," November 2022, https://www.quantitativebrokers.com/blog/what-is-market-microstructurenbsp.

[42] Maureen O'Hara, *Market Microstructure Theory* (New Jersey: Willey, 1998).

[43] *Ibid.*

[44] James Chen, "What Is Price Discovery? Definition, Process, and vs. Valuation," Investopedia, May 4, 2022, https://www.investopedia.com/terms/p/pricediscovery.asp.

main focus of price discovery is the availability and accessibility of information that can influence market participants' behavior, where decision-making depends on price transparency and market volatility. Given the current conditions, IDXCarbon has provided information on daily and monthly market prices that can be accessed by the public through its website. In addition to prices, PTBAE-PU and SPE-GRK, as products within IDXCarbon, are also fully listed on the SRN PPI and accessible to the public. These two efforts are intended to create a transparent market. However, price discovery is not limited to the transparency of detailed product information in terms of price and quantity alone; market volatility also influences the behavior of market participants.

Second, volatility refers to the upward and downward movement of product prices, based on the frequency of price changes and the extent of such changes.[45] Market volatility can be attractive to businesses as it creates opportunities to profit by selling when product prices rise or buying when they fall.[46] Therefore, volatility serves as a signal for businesses to sell, buy, or hold onto their products. To determine market volatility, calculations depend on the trading volume of the market.[47] However, even though information regarding the number and value of transactions has been publicly disclosed, volatility in IDXCarbon remains unmeasured due to the limited number of transactions, making it impossible to project price fluctuations.

[45] The Economic Times, "What Is 'Volatility,'" n.d., https://economictimes.indiatimes.com/definition/volatility.

[46] Adam Hayes, "Volatility: Meaning in Finance and How It Works With Stocks," Investopedia, July 3, 2024, https://www.investopedia.com/terms/v/volatility.asp.

[47] Putu Ayu Supriati and Ni Luh Putu Wiagustini, "Pengaruh Volume Perdagangan Terhadap Volatilitas (Studi Pada Bursa Efek Indonesia Dan New York Stock Exchange)," E-Jurnal Manajemen Universitas Udayana 8, no. 4 (2019): 2438–2465, https://doi.org/10.24843/EJMUNUD.2019.v08.i04.p20.

Third, liquidity refers to the ease of conducting transactions by selling or buying a product.[48] Liquidity is necessary for the market to reduce the risk of market participants. If a product cannot be sold immediately due to a lack of buyers, it may lose its value and profit potential.[49] Similar to the issue of volatility, the liquidity of IDXCarbon cannot yet be assessed, given the low number of transactions on the carbon exchange. This means that products on IDXCarbon cannot be considered easy to sell or illiquid.

When IDXCarbon was established as an ideal market, it was essential to ensure that price discovery, volatility, and liquidity could function properly. To fulfill these three elements, the main factor is market participation.[50] The larger the transaction volume, the easier it is to measure market volatility and liquidity by showing market price projections and comparisons between supply and demand prices.[51] Although IDXCarbon has provided a market for carbon trading, based on market microstructure theory, trading on IDXCarbon has not been running well due to low participation.

Based on the above explanation, it can be understood that the three elements of market microstructure have not yet been fully formed due to the minimal number and value of transactions. This causes business actors to be uninterested in conducting transactions, but at the same time, the market cannot function without participants. Therefore, to find the cause of the low participation, it is necessary to review the other side, namely the products in IDXCarbon.

b. Products on IDXCarbon

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[48] ECB Europe, "Understanding Financial Market Liquidity," June 2007, https://www.ecb.europa.eu/press/financial-stability-publications/fsr/focus/2007/pdf/ecb-cc3931849f.fsrbox200706_09.pdf.

[49] Claudio Borio, "Special Feature: Market Liquidity and Stress: Selected Issues and Policy Implications," *BIS Quarterly Review*, November 2000, 38–51, https://www.bis.org/publ/r_qt0011e.pdf.

[50] Maureen O'Hara, *Op. Cit.*

[51] *Ibid.*

Products have value when offered in the market if they are able to meet the needs of buyers.[52] Products must not only consider the quantity to be offered, but also the quality. Both quantity and quality must be considered for better market progress and development.[53] When it comes to carbon trading, there are two main components that need to be considered, namely the quantity and quality of the product.

1) Quantity of Carbon Products Offered and Requested

As previously explained, emissions trading is a mandatory trade imposed by the government on certain sectors, and currently the mandated sector is the energy sector - the power generation sub-sector. Pursuant to Article 28 Paragraph (3) of Regulation of the MEMR 16/2022, businesses that fail to participate in emissions trading after receiving PTBAE-PU will be issued a written warning by the Minister of Energy and Mineral Resources through the Director General of Electricity, and their PTBAE-PU allocation will be reduced to 75% for the next emissions trading period. However, these sanctions are merely administrative and insufficiently effective to compel or deter businesses from participating in carbon trading. Business entities simply choose to continue being subject to PTBAE-PU reductions while continuing to operate as usual. This results in business entities holding remaining PTBAE-PU being unable to sell their remaining PTBAE-PU because no other business entities are participating in carbon trading, and vice versa. As a result, the quantity of PTBAE-PU offered and demanded becomes unbalanced, causing the three elements of the market microstructure to be unfulfilled. If this is the case, carbon trading will

[52] Chandra Widi Sudaryanto and Sri Rahayu Tri Astuti, "Analisis Pengaruh Kualitas Produk, Kualitas Pelayanan, Dan Kinerja Perusahaan Terhadap Kepuasan Pelanggan," *Diponegoro Journal of Management* 6, no. 1 (2017): 49–58, https://doi.org/https://ejournal3.undip.ac.id/index.php/djom/article/view/17520.

[53] Anggi, "Kuantitas Dan Kualitas Produk, Mana Yang Paling Penting?," accurate, April 13, 2022, https://accurate.id/marketing-manajemen/kuantitas-dan-kualitas/.

not be attractive to business actors because the sanctions imposed are only administrative sanctions that will not affect company operations.

Furthermore, from the perspective of voluntary GHG emission offset trading, there are three listed projects that generate SPE-GRK for trading on IDXCarbon, including (1) Lahendong Project Units 5 and 6; (2) Construction of a new natural gas-fired power plant Block 3; and (3) Operation of a mini-hydro power plant.[54] On the supply side, as of September 26, 2024, these three projects generated approximately 1,777,141 tCO_2e.[55] However, considering the volume of carbon units sold and the frequency of trading, the demand from businesses is still relatively small. Within approximately one year of trading, or by September 2024, 1,356,991 tCO_2e remained unsold.[56] This means that the demand from businesses did not even reach half of the carbon units offered. This requires synergy and support from relevant agencies or ministries to support carbon trading as an effort to reduce GHG emissions, which is mandatory for companies in Indonesia.

2) Quality of Products Offered

Product quality can influence market behavior, whereby the higher the quality of a product, the higher its selling value.[57] This means that businesses need to maintain consistent product quality, while the government plays a role in overseeing market sustainability. Several issues that can affect the credibility of PTBAE-PU and SPE-GRK products traded on IDXCarbon include public and Customary Law Community (*Masyarakat Hukum Adat* - **"MHA"**) rejection,

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[54] Abbas, *Loc.cit*

[55] Kumparan Bisnis, "BEI: Transaksi Bursa Karbon RI Lebih Tinggi Dibandingkan Di Malaysia Dan Jepang," October 3, 2024, https://kumparan.com/kumparanbisnis/bei-transaksi-bursa-karbon-ri-lebih-tinggi-dibandingkan-di-malaysia-dan-jepang-23e2QXiaKhI.

[56] IDXCarbon, "IDXCarbon Daily Trading," September 30, 2024, https://idxcarbon.co.id/id/data-daily.

[57] Endang Raino Wirjono, "Tingkat Kesadaran Pelaku Usaha Dalam Implementasi Pertanggungjawaban Sosial (Corporate Social Responsibility," *Conference in Business, Accounting, and Management (CBAM)* 1, no. 1 (2012): 201–13, https://doi.org/https://jurnal.unissula.ac.id/index.php/cbam/article/view/134/110#.

double counting, greenwashing, fraud, and money laundering, as these can reduce or even eliminate the value of the products, thereby affecting the purchase price of PTBAE-PU and SPE-GRK.[58]

First, regarding public rejection. Environmental activists, legal research institutions, and other business actors have stated that carbon trading is not a solution to emissions and global warming, but rather gives a "license" to continue polluting.[59] Rejection of carbon trading has also been expressed by the Alliance of Indigenous Peoples of Nusantara (*Aliansi Masyarakat Adat Nusantara* - "**AMAN**"), which represents MHA. AMAN argues that the current mechanism will endanger the rights of MHA, as the expansion of carbon projects is feared to take over indigenous territories without the knowledge or consent of MHA.[60] Additionally, the public believes that there are government policies that contradict the vision of carbon trading. The widespread negative publicity has raised doubts about participating in the carbon market, as it is seen as failing to address the urgency of the issue.[61] Therefore, the government must guarantee that carbon projects that intersect with indigenous territories obtain free, prior, and informed consent from the relevant MHA after providing all relevant information, such as plans, projections, and activities to be carried out.

[58] Muhammad Rafi Bakri and Muhammad Husaini Fikri, "Beware: Carbon Trading Opens up New Avenues for Fraud," The Jakarta Post, September 27, 2023, https://www.thejakartapost.com/opinion/2023/09/27/beware-carbon-trading-opens-up-new-avenues-for-fraud.html; Mathew John, "A False Shade of Green: Criminal Contours of Carbon Trading," Linkedin, May 25, 2023, https://www.linkedin.com/pulse/false-shade-green-criminal-contours-carbon-trading-mathew-john/; Hans Nicholas Jong, "Indonesia Opens Carbon Trading Market to Both Skepticism and Hope," Mongabay, October 12, 2023, https://news.mongabay.com/2023/10/indonesia-opens-carbon-trading-market-to-both-skepticism-and-hope/.

[59] WALHI, "Kertas Posisi WALHI Perdagangan Karbon: Jalan Sesat Atasi Krisis Iklim," Walhi, August 8, 2023, https://www.walhi.or.id/kertas-posisi-walhi-perdagangan-karbon-jalan-sesat-atasi-krisis-iklim; Nadya Zahira, "Celios Ungkap Cara Agar Bursa Karbon Tak Jadi Praktik Greenwashing," katadata.co.id, October 4, 2023, https://katadata.co.id/ekonomi-hijau/energi-baru/651d7ca238bf9/celios-ungkap-cara-agar-bursa-karbon-tak-jadi-praktik-greenwashing.

[60] Hans Nicholas Jong, *Loc.cit*

[61] Antara, *Loc.cit*

In addition, the government also needs to ensure that all regulations related to carbon projects take environmental issues into account.

Second, double counting is the process of counting carbon units twice, with two scenarios: 1) when carbon unit certification is issued more than once, either due to an error by the issuing institution or as an attempt to obtain additional financial benefits; and 2) when existing carbon units are claimed by more than one party.[62] If a claim by two entities occurs, these two entities are generally business actors carrying out emissions balancing (e.g., green projects) and the country where the project is carried out that wants to achieve its climate targets.[63] This actually contradicts the purpose of carbon offsets because there is no accurate calculation of effectiveness. The existence of double counting will eliminate the value of SPE-GRK, which can reduce its marketability. This issue has actually been considered by the Ministry of Environment and Forestry before carbon trading began. The Ministry of Environment and Forestry has the SRN PPI as a database that provides data and information to the public about adaptation and mitigation actions and their achievements based on the principles of clarity, transparency, and understanding.[64] Pursuant to Article 51 of Regulation of the MoEF 21/2022, in recording data in the SRN PPI, businesses are required to report all information related to the issuance and transfer of carbon units both domestically and internationally.[65]

Furthermore, Article 54 of Regulation of the MoEF 21/2022 stipulates that every PTBAE-PU and SPE-GRK that has been used and accounted for as emission reductions shall be transferred to the

[62] Sophie Scherger, "EU's Double Standards on Double Counting," Institute for Agriculture & Trade Policy, December 4, 2023, https://www.iatp.org/eus-double-standards-double-counting.

[63] *Ibid.*

[64] Kementerian Lingkungan Hidup dan Kehutanan Direktorat Jenderal Pengendalian Perubahan Iklim, "User Manual Sistem Registri Nasional Pengendalian Perubahan Iklim," November 2016, https://srn.menlhk.go.id/static/srn/PDF/fin_manual_srn_publik.pdf.

[65] Article 51 of Regulation of the MoEF 21/2022

cancellation account in the SRN PPI carbon registry. The cancellation account will record the following information: (a) the number of PTBAE-PU and/or SPE-GRK used; (b) the purpose of use; and (c) the party using the PTBAE-PU and/or SPE-GRK if the business entity using them is not the owner of the operational account from which the PTBAE-PU and/or SPE-GRK originated. The same provisions are also contained in the Board of Directors' Decision of PT Bursa Efek Indonesia Number Kep-00295/BEI/09-2023 regarding Regulations on the Registration of Carbon Units at the Carbon Exchange Operator, where businesses that purchase SPE-GRK on IDXCarbon and wish to use such SPE-GRK for emission reduction calculations must submit a usage request (*retirement*) to IDXCarbon. The application for use will be submitted through the SRN PPI for approval. If approval is granted, the SPE-GRK will be assigned a serial number and subsequently transferred to the cancellation account. Additionally, on its website, IDXCarbon has implemented blockchain technology to prevent double counting.[66] As explained above, the issue of double counting has been addressed through the recording and reporting mechanisms within IDXCarbon and the SRN PPI, as the Directorate General of Climate Change Mitigation will perform corresponding adjustments for each unit of carbon generated.

Third, greenwashing, or marketing strategies implemented by companies to deceive consumers into believing that the company has produced environmentally friendly products, as has occurred in the United States.[67] This action is carried out by large companies such as Shell, Disney, and Gucci by simply purchasing carbon units and then continuing to produce emissions without taking any mitigation

[66] IDXCarbon, *Loc.cit*

[67] Magang Alam LindungiHutan, "Greenwashing, Strategi Green Marketing Yang Harus Dihindari," LindungiHutan, February 9, 2023, https://lindungihutan.com/blog/pengertian-greenwashing-dan-contoh-kasusnya/.

actions.[68] The practice of greenwashing causes skepticism towards business actors, resulting in a loss of trust in carbon trading, thereby reducing the intention to purchase carbon units.

Fourth, fraud or deception generally occurs by conducting transactions without changing ownership, forming or manipulating prices in the market, creating the appearance of trade and market conditions, and conveying false information to influence prices in the market.[69] When linked to carbon exchanges, businesses as buyers or sellers still have room to commit fraud for their own gain by purchasing as many carbon units as possible to influence supply and demand in the market.

Fifth, money laundering, which involves using illegal funds to purchase carbon units and then reselling them. The profits from the sale of carbon units are used to cover the illegal funds and make them appear as legitimate profits.[70] Additionally, businesses may combine illegal and legal funds to finance a carbon offset project, which then generates carbon units for sale, with the net profits having passed through the money laundering process.[71] This issue was also previously warned by Achmad Deni Daruri, founder of Bumi Global Foundation, who stated that carbon project verification institutions are highly vulnerable to bribery to manipulate verification reports and credit claims for sale. This issue has occurred in Indonesia, where PT Carbon Capital Indonesia is suspected of laundering Rp1.3 trillion through a carbon trading scheme, and PT Rimba Makmur Utama received profits from carbon unit sales without proving that its carbon

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[68] Restu Diantina Putri, "Bursa Karbon, Potensi Triliunan & Ancaman Proyek Bodong," tirto.id, October 11, 2023, https://tirto.id/bursa-karbon-potensi-triliunan-rupiah-ancaman-proyek-bodong-gQVv.

[69] Environmental Crime Programme, "Guide to Carbon Trading Crime," June 2013, https://www.interpol.int/content/download/5172/file/Guide%20to%20Carbon%20Trading%20Crime.pdf.

[70] *Ibid.*

[71] Mathew John, *Loc.cit*

projects actually reduced emissions.[72] Carbon trading has instead become a tool for money laundering, which can undermine the effectiveness of the carbon trading system itself. Issues of fraud and money laundering undoubtedly erode the sense of security for businesses engaging in transactions on IDXCarbon.

2. Other Alternatives for Businesses to Reduce GHG Emissions

With increasing global awareness of the importance of sustainability and environmental social responsibility, companies in Indonesia are now moving towards adopting ESG principles in their business practices. In the environmental context, companies are committed to reducing their GHG emissions through various GHG emission reduction efforts, such as transitioning to renewable energy, reducing fossil fuel consumption and switching to biomass use, sustainable waste management practices, and more efficient energy use such as energy-efficient lighting and efficient cooling systems, or engaging in carbon trading as done by several companies such as Pertamina, Bank Central Asia (BCA), PT Austindo Nusantara Jaya Tbk, and PT Ajinomoto.[73]

These GHG emission reduction efforts can be seen in the sustainability reports released by each company every year as regulated in Regulation of the Financial Services Authority Number 51/POJK.03/2017 on the Implementation of Sustainable Finance for

[72] Iwan Purwantono, "Founder BGK Ingatkan Tingginya Potensi Fraud Di Bursa Karbon," inilah.com, October 26, 2023, https://www.inilah.com/founder-bgk-ingatkan-tingginya-potensi-fraud-di-bursa-karbon.

[73] PT Austindo Nusantara Jaya Tbk, "Pengurangan Emisi GRK," ANJ, December 31, 2023, https://www.anj-group.com/id/emisi-gas-rumah-kaca; Pertamina, "Emisi Gas Rumah Kaca," n.d., https://www.pertamina.com/Id/ghg-emission; Jatim Newsroom, "Gubernur Khofifah Apresiasi Gudang Biomassa PT Ajinomoto Dan Dorong Percepatan Transisi Energi," Dinas Kominfo Provinsi Jawa Timur, January 12, 2024, https://kominfo.jatimprov.go.id/berita/gubernur-khofifah-apresiasi-gudang-biomassa-pt-ajinomoto-dan-dorong-percepatan-transisi-energi; BCA, "Terapkan Efisiensi Sangat Tinggi, Wisma BCA Foresta Raih Sertifikat Green Mark Super Low Energy Building Pertama Di Indonesia," October 2, 2024, https://www.bca.co.id/id/tentang-bca/media-riset/pressroom/siaran-pers/2024/10/07/02/42/terapkan-efisiensi-sangat-tinggi-wisma-bca-foresta-raih-sertifikat-green.

Financial Services Institutions, Issuers, and Public Companies (**"OJK Regulation 51/2017"**). A sustainability report, commonly referred to as a sustainability report, is a public report that outlines a company's economic, financial, social, and environmental performance in conducting sustainable business operations. More specifically, referring to Annex II of OJK Regulation 51/2017, the sustainability report includes an explanation of the sustainability strategy, an overview of sustainability aspects (economic, social, and environmental), a brief company profile, a statement from the board of directors, sustainability governance, sustainability performance, written verification from an independent party, feedback from readers, and the company's response to feedback on the previous annual report. In the company's response to feedback, the company provides a feedback form containing an assessment of the ease of understanding the report's content, suggestions, and/or input. This feedback may be provided by shareholders, customers/consumers, employees, the media, the government, business partners, and others, and must be addressed in the following year's annual report.

Regarding environmental aspects, particularly energy use and emissions, companies are required to record: (1) energy use (quantity and intensity of energy used) and efforts and achievements in energy efficiency; (2) the quantity and entities of emissions generated by type, and efforts to achieve emission reductions; and (3) provide a comparison of energy use and emission reductions achieved over the past three years. In line with these provisions, referring to several sustainability reports published on each company's website, these companies are more focused on reducing GHG emissions internally rather than through carbon trading. These internal efforts include energy efficiency and decarbonization initiatives, such as using biomass as an environmentally friendly fuel, reducing electricity consumption,

planting trees, installing solar panels to save energy and reduce carbon emissions, and others.

To gain a deeper understanding of the efforts or programs undertaken by companies to reduce GHG emissions, the author conducted research on the sustainability reports of several companies that received the Katadata Environmental, Social & Governance Award (KESGI).[74] The following is a summary of the sustainability reports from PT Bumi Resources Tbk (mining sector), PT Unilever Indonesia Tbk (food and beverage industry sector), and PT Bank Negara Indonesia (financial sector).

a. **PT Bumi Resources Tbk**[75]

PT Bumi Resources Tbk is the largest coal producer in Indonesia, owned by the Bakrie Group. As a coal producer, PT Bumi Resources Tbk emits around 2-3 million tCO_2e annually. According to the 2023 sustainability report, GHG emissions during that year amounted to 3,833,360 tCO2e from the use of diesel fuel and coal production processes, from mining to combustion. Recognizing the significant amount of GHG emissions generated, PT Bumi Resources Tbk has implemented several emission reduction efforts through coal savings, replacing trucks with overland conveyors to transport coal, using biodiesel, revegetation, installing solar panels, installing timers on air conditioners and lights in office areas, using wind turbine power, using electric vehicles, substituting electricity sources from generators to PLN, planting and growing emission-absorbing trees, and others. The program has succeeded in reducing GHG emissions by 410,411 tCO_2e.

[74] KESGI is an award given by Katadata to companies that have made significant contributions to the Indonesian economy and prioritize sustainability principles. The KESGI assessment covers ESG aspects, including reporting on environmental costs, environmentally friendly materials, energy, biodiversity, emissions, waste, and influence.

[75] PT BUMI Resources Tbk, "Laporan Keberlanjutan 2023," April 30, 2024, https://www.bumiresources.com/sustainability/reports.

b. **PT Unilever Indonesia Tbk**[76]

PT Unilever Indonesia Tbk (Unilever) is one of the leading Fast Moving Consumer Goods (FMCG) companies in Indonesia, established in 1981 and offering a wide range of products from home care, personal care, foods and refreshments, and Unilever Food Solutions (UFS). As a company that provides essential goods, Unilever conducts its operational activities through production processes that inevitably generate GHG emissions. According to the annual report released, Unilever Tbk's GHG emissions in 2022 reached 15,516 tCO_2e and in 2023 reached 14,662 tCO_2e. Various efforts undertaken by Unilever include energy efficiency, transitioning to renewable heat sources such as biomass and installing solar panels, and reducing refrigerant emissions by replacing them with more environmentally friendly alternatives. These efforts have successfully reduced GHG emissions by 11.22% compared to the previous year.

c. **PT Bank Negara Indonesia (Persero) Tbk**[77]

PT Bank Negara Indonesia Tbk (BNI) is one of the state-owned banks operating in the general banking services sector. In its sustainability report, BNI reported GHG emissions from fuel consumption for buildings, the use of freon in cooling systems, operational fuel consumption, business air travel, emergency business travel, and financing emissions. To reduce these emissions, BNI implemented the "Earth Hour" program, which involves turning off office lights during break times, improving energy efficiency by using energy-saving lights in some office buildings, reducing the use of

[76] Unilever, "90 Tahun Dedikasi Bagi Tanah Air Yang Sehat, Sejahtera Dan Lestari | Laporan Keberlanjutan Sustainability Report 2023," April 30, 2024, https://www.unilever.co.id/files/92ui5egz/production/b09b866ad741012ce8bf771fb3368ee219d98980.pdf.

[77] PT Bank Negara Indonesia (Persero) Tbk, "Moving Towards A Sustainable Future | Laporan Keberlanjutan 2023," 2024, https://www.bni.co.id/Portals/1/BNI/Perusahaan/HubunganInvestor/Docs/SR-BNI-2023-INA-final_highres.pdf.

chillers on non-working days, using magnetic bearing technology in office cooling systems, installing solar panels, planting thousands of trees, limiting business travel and replacing it with remote communication, constructing green buildings with environmentally friendly and energy-efficient designs, and implementing a sustainability link loan program. BNI's GHG emission reduction efforts in 2023 succeeded in reducing 233,749 tCO_2e from GHG emissions amounting to 28,599,392 tCO_2e.

The requirement under OJK Regulation 51/2017 to prepare sustainability reports covering efforts and achievements in reducing GHG emissions has encouraged companies in Indonesia to reduce GHG emissions through various energy efficiency initiatives and transitions to sustainable business practices. Looking at the GHG emission reduction efforts of several companies above, it is evident that carbon trading has not yet become the primary instrument in GHG emission reduction strategies. Companies tend to focus more on internal efforts through energy efficiency programs and the use of renewable energy. This indicates that companies view carbon trading as an additional option, rather than the primary solution for reducing their GHG emissions.

IV. Solutions For Carbon Trading in Indonesia

1. Stronger sanctions for emissions trading

Pursuant to Article 28 Paragraph (2) and (3) of Regulation of MEMR 16/2022, the current sanctions for emissions trading are a written warning issued by the Minister of Energy and Mineral Resources through the Director General of Electricity and a reduction in the allocation of PTBAE-PU for the next emissions trading period. However, these sanctions are merely administrative in nature and are not sufficiently effective to compel or deter businesses from participating in carbon

trading. Businesses will continue to face reductions in PTBAE-PU allocations and remain able to operate as usual. This would be different if stricter sanctions, such as fines, were imposed, as businesses would then be indirectly required to participate in carbon trading.

These fines have also been implemented in several countries that have adopted a carbon trading system, including the following:[78]

TABLE 2. Imposition of Sanctions toward the Violation of Carbon Trading in Other Countries

Country	European Union	England	South Korea	China
Emission Trading System	EU Emissions Trading System (EU ETS)	UK Emissions Trading Scheme	Korea Emissions Trading Scheme	China National Carbon Market
Sanction	Access to the registry account will be locked if emission reporting is not submitted by the specified deadline, and a penalty of €100 per ton of CO2 will be imposed if excess emissions are not paid for	A fine of £100 per ton of CO2 will be imposed, and the names of non-compliant businesses will be made public as a	A fine equal to three times the average carbon price or KRW 100,000, whichever is higher, will be imposed.	A fine of CNY 10,000 to 30,000 will be imposed for failing to submit an emissions trading report, and a fine of

[78] International Carbon Action Partnership (ICAP), "Emissions Trading Worldwide Status Report 2023," 2023, https://icapcarbonaction.com/system/files/document/ICAP%20Emissions%20Trading%20Worldwide%202023%20Status%20Report_0.pdf.

	within the designated period.	form of transparency and social pressure.	CNY 20,000 to 30,000 will be imposed for failing to pay for excess emissions.

Reflecting on the carbon trading sanction regulations in several countries above, carbon trading in Indonesia should not only emphasize the obligation of business actors to implement carbon trading, but also impose fines to ensure that business actors comply with their obligations. In addition to providing a deterrent effect, the application of these sanctions also encourages participation so that carbon unit sales and purchase transactions can run actively on both the supply and demand sides.

2. Incentives to business actors participating in carbon trading

To address the low participation in Indonesia's carbon trading, the government needs to provide incentives to businesses that participate in carbon trading on their own initiative. Based on the Board of Directors Decision of PT Bursa Efek Indonesia No. Kep-00297/BEI/09-2023 regarding the Rules for Carbon Exchange Service Users and Circular Letter No. SE-00013/BEI/09-2023 regarding Carbon Exchange Service Fees, the fees imposed on businesses on IDXCarbon include user registration fees, carbon unit registration fees, transaction fees, fund withdrawal fees, and additional training fees. To attract participants at the initial launch of IDXCarbon, PT BEI waived user registration fees until September 25, 2024.[79] However, after evaluating the first year of

[79] Decision Letter of the Board of Directors of PT Bursa Efek Indonesia No. Kep-00297/BEI/09-2023 regarding Regulations on the Use of Carbon Exchange Services

IDXCarbon's operations and the transactions conducted within it, PT BEI, through the Board of Directors' Decision of PT Bursa Efek Indonesia No. Kep-00148/BEI/09-2024 regarding the Carbon Service User Regulations, extended the validity period of the registration fee waiver until September 25, 2025, to increase transactions and boost the Indonesian carbon exchange after one year of IDXCarbon's operation.[80] This extension of the incentive clearly demonstrates efforts to encourage transactions and liquidity in IDXCarbon.

However, to increase transaction value in IDXCarbon and meet the potential expectations of the Indonesian carbon exchange of Rp3,000 trillion, there are other more effective and beneficial incentives, namely the transaction fee reduction incentive that was previously in effect until October 31, 2023. The transaction fee reduction incentive is 0.05% for the regular market and negotiation market, and 0.11% for the auction market and non-regular market.[81] Compared to the one-time registration fee waiver when businesses register, the transaction fee reduction incentive is more motivating for businesses to participate because they receive tangible benefits, thereby increasing transaction value. Therefore, IDXCarbon can reintroduce this transaction fee reduction incentive to further increase market participation.

In addition to financial incentives, other incentives that can be provided include awards for businesses that have participated in carbon trading on their own initiative. The awards could be modeled after the OJK's Sustainable Finance Award. This award is given by the OJK to companies in Indonesia that demonstrate a high level of environmental awareness. The Sustainable Finance Award is awarded to companies that

[80] Abdul Aziz, "Bursa Karbon Sepi, Biaya Pendaftaran PJBK Gratis Lagi," Halo!Bisnisnews, September 27, 2024, https://bisnis.hallo.id/bisnis/7313624525/bursa-karbon-sepi-biaya-pendaftaran-pjbk-gratis-lagi; Yuliana Hema, "BEI Perpanjang Berbagai Insentif Untuk Mendongkrak Bursa Karbon Indonesia," kontan.co.id, October 3, 2024, https://investasi.kontan.co.id/news/bei-perpanjang-berbagai-insentif-untuk-mendongkrak-bursa-karbon-indonesia.

[81] IDXCarbon Circular Letter Number: SE-00013/BEI/09-2023 on Carbon Exchange Service User Fees

effectively implement sustainable finance. Sustainable finance refers to the support provided by companies to develop and implement environmental economic instruments by providing funding for climate change mitigation or adaptation.[82] This means that sustainable finance is an approach to financial management that not only pursues financial gains but also considers environmental and social aspects.

By following the example of the Sustainable Finance Award, the government can give awards to companies that allocate part of their funds to various climate change mitigation actions, including playing an active role in Indonesia's carbon trading. By incorporating active participation in carbon trading as one of the evaluation criteria, this award can attract the interest of businesses to consider carbon trading as one of the efforts to reduce greenhouse gas emissions or climate change mitigation actions. As a result, Indonesia's carbon trading is expected to operate optimally in line with its objective of achieving the ENDC targets.

3. Tighten supervision of the work of the Validation and/or Verification Body to address carbon trading issues.

To address the issues of greenwashing, fraud, and money laundering that may influence business actors' decisions to participate in carbon trading, sanctions have been established for business actors who violate PR 98/2021 and Regulation of the MoEF 21/2022. These sanctions include the suspension and revocation of forest concession permits by the Ministry of Environment and Forestry. Therefore, business actors or developers of GHG emission offset projects who are proven to have violated carbon trading regulations may be subject to sanctions as stipulated in the applicable laws and regulations.

Additionally, to address the issues of greenwashing, fraud, and money laundering, an independent institution is needed to validate and verify every carbon unit traded to ensure the quality and credibility of carbon unit products. In this context, Validation and/or Verification Body

[82] Elucidation of OJK Regulation 51/2017

(*Lembaga Validasi dan/atau Verifikasi* - "**LVV**") are the solution to address these issues. To date, there are several accredited LVV in Indonesia. LVV are independent institutions responsible for validating and verifying mitigation projects and carbon unit calculations in accordance with the calculation methodologies established by the relevant ministries. From a conceptual standpoint, the validation and verification process conducted by LVV, which involves a lengthy process and multiple stakeholders, can create a system of checks and balances.

Currently, LVV must undergo accreditation and periodic field supervision by the National Accreditation Committee (*Komite Akreditasi Nasional* - "**KAN**")[83], which has the competence as a validator and verifier of climate change mitigation action achievements and has no direct or indirect interest in the implementation of climate change mitigation actions. To ensure the quality of validation and verification, LVV are required to implement systems or requirements established by KAN.[84] Additionally, the Additional Accreditation Requirements for LVV in the Environmental Information Sector, issued by KAN, stipulate that if an LVV is found to have committed fraud, forgery, misconduct, intentional concealment of information, or other legal violations, its accreditation will be revoked.[85] Therefore, the implementation of the calculation and certification mechanisms must also ensure that KAN's strict oversight of LVV's operational systems provides assurance regarding the validity of validation reports, verification reports, and carbon claims made by

[83] KAN is a non-structural institution tasked with carrying out the duties and responsibilities of the government in the field of LPK accreditation. In carrying out its duties, KAN is under and responsible to the President through the Head of BSN.

[84] Komite Akreditasi Nasional, "Syarat Dan Aturan Akreditasi Lembaga Penilaian Kesesuaian," January 2, 2019, https://kan.or.id/unduh/NewKAN/KAN%20U-01%20Syarat%20dan%20Aturan%20Akreditasi%20LPK.pdf. Rules that must be followed by LVV: SNI/ISO/IEC 17029:2019, ISO/IEC 14065:2020, ISO 14066:2011, ISO 14064-3:2019, IAF MD 6:2014, KAN General Requirements Document, K-10. 03 Rev.0 Additional Accreditation Requirements for LVV in the Environmental Information Sector Based on the NEK Regulatory Scheme.

[85] *Ibid.*

businesses. This will establish a control mechanism for the quality and credibility of carbon trade products.

V. Conclusion

Carbon trading is expected to be one of the instruments to combat global warming by limiting and offsetting GHG emissions. Indonesia, as one of the countries with a strong commitment to climate change action, has taken strategic steps to support carbon trading, including enacting legislation on carbon trading mechanisms and launching a carbon exchange as a venue for trading carbon units. However, in reality, Indonesia's carbon trading has not been running smoothly because it has not been able to attract market participation, resulting in low trading volumes on IDXCarbon and a significant number of unsold carbon units remaining. Looking at these issues, several contributing factors can be identified. First, IDXCarbon has not been able to establish an ideal market. Second, there are alternative options for businesses to reduce their GHG emissions besides carbon trading.

Regarding IDXCarbon as an ideal market, there are three important elements in a market, namely price discovery, volatility, and liquidity. Based on market microstructure theory, these three elements are very important in a market. If these three elements cannot be fulfilled, then the market itself cannot function optimally. Unfortunately, these three elements have not yet been realized in IDXCarbon. Additionally, when examining sustainability reports from several companies in Indonesia, carbon trading has not become the primary instrument in their efforts to reduce GHG emissions. Instead, these companies tend to focus on internal operational efforts, such as energy efficiency, transitioning to new and renewable energy sources, tree planting, or using environmentally friendly fuels. This results in low market participation and low demand for carbon units.

To address this, the following solutions can be proposed: 1) impose fines on businesses that fail to comply with their obligations to participate in carbon trading; 2) provide incentives to businesses that voluntarily

participate in carbon trading; and 3) strengthen oversight of the LVV system to address issues related to carbon trading.

References

Abbas. "Strategi Meramaikan Bursa Karbon Indonesia." CakrawalaToday, August 26, 2024. https://cakrawalatoday.com/2024/08/26/strategi-meramaikan-bursa-karbon-indonesia/.

Adhikerana, Asep S. "Nature-Based Solutions Untuk Perubahan Iklim." EcoNusantara, February 16, 2022. https://econusantara.org/nature-based-solutions-untuk-perubahan-iklim/.

Ahdiat, Adi. "Emisi Gas Rumah Kaca Indonesia Meningkat Pada 2022, Tembus Rekor Baru." databoks, September 29, 2023. https://databoks.katadata.co.id/lingkungan/statistik/8d993dfb8c5e35c/emisi-gas-rumah-kaca-indonesia-meningkat-pada-2022-tembus-rekor-baru.

Alfarizy, Valiant, Sayyidah Mariyatul Ulfa, Syerra S. Liyadi, Zhafira Farahiya, and Rohmad Ludiasa. "Mekanisme Hukum: Perdagangan Karbon Melalui Bursa Karbon Di Indonesia." *UNES Law Review* 6, no. 2 (December 2023): 7354–65. https://doi.org/https://doi.org/10.31933/unesrev.v6i2.

Anggi. "Kuantitas Dan Kualitas Produk, Mana Yang Paling Penting?" accurate, April 13, 2022. https://accurate.id/marketing-manajemen/kuantitas-dan-kualitas/.

Aprilia, Zefanya. "Duh! Perdagangan Bursa Karbon Di RI Masih Jauh Di Bawah Ekspektasi." CNBC Indonesia, July 4, 2024. https://www.cnbcindonesia.com/market/20240704173540-17-551871/duh-perdagangan-bursa-karbon-di-ri-masih-jauh-di-bawah-ekspektasi.

———. "OJK Bantah Perdagangan Bursa Karbon Sepi." CNBC Indonesia, July 22, 2024.

https://www.cnbcindonesia.com/market/20240722171314-17-556712/ojk-bantah-perdagangan-bursa-karbon-sepi.

Ariyanti, Suci, Suwarno Abadi, and Taufiqurrahman Taufiqurrahman. "Implementasi Perdagangan Karbon Di Indonesia Pasca Terbitnya POJK Nomor 14 Tahun 2023 Tentang Bursa Karbon." *Law and Humanity* 2, no. 1 (April 2024): 18–39. https://doi.org/10.37504/lh.v2i1.606.

Aziz, Abdul. "Bursa Karbon Sepi, Biaya Pendaftaran PJBK Gratis Lagi." Halo!Bisnisnews, September 27, 2024. https://bisnis.hallo.id/bisnis/7313624525/bursa-karbon-sepi-biaya-pendaftaran-pjbk-gratis-lagi.

Baker, Aryn. "2023 Was The Hottest Year Ever and 2024 May Be Even Worse." TIME, January 12, 2024. https://time.com/6554830/2023-hottest-year-ever/.

Bakri, Muhammad Rafi, and Muhammad Husaini Fikri. "Beware: Carbon Trading Opens up New Avenues for Fraud." The Jakarta Post, September 27, 2023. https://www.thejakartapost.com/opinion/2023/09/27/beware-carbon-trading-opens-up-new-avenues-for-fraud.html.

BCA. "Terapkan Efisiensi Sangat Tinggi, Wisma BCA Foresta Raih Sertifikat Green Mark Super Low Energy Building Pertama Di Indonesia," October 2, 2024. https://www.bca.co.id/id/tentang-bca/media-riset/pressroom/siaran-pers/2024/10/07/02/42/terapkan-efisiensi-sangat-tinggi-wisma-bca-foresta-raih-sertifikat-green.

Borio, Claudio. "Special Feature: Market Liquidity and Stress: Selected Issues and Policy Implications." *BIS Quarterly Review*, November 2000, 38–51. https://www.bis.org/publ/r_qt0011e.pdf.

Chen, James. "What Is Price Discovery? Definition, Process, and vs. Valuation." Investopedia, May 4, 2022. https://www.investopedia.com/terms/p/pricediscovery.asp.

Climate Transparency Organization. "Indonesia Climate Transparency Report: Comparing G20 Climate Action," 2022. https://www.climate-transparency.org/wp-content/uploads/2022/10/CT2022-Indonesia-Web.pdf.

CNN Indonesia. "Jokowi Sebut Potensi Bursa Karbon RI Bisa Capai Rp3.000 T," September 26, 2023. https://www.cnnindonesia.com/ekonomi/20230926112939-532-1003799/jokowi-sebut-potensi-bursa-karbon-ri-bisa-capai-rp3000-t.

Copernicus. "2023 Is The Hottest Year On Record, With Global Temperatures Close To The 1.5°C Limit," January 9, 2024. https://climate.copernicus.eu/copernicus-2023-hottest-year-record.

ECB Europe. "Understanding Financial Market Liquidity," June 2007. https://www.ecb.europa.eu/press/financial-stability-publications/fsr/focus/2007/pdf/ecb~cc3931849f.fsrbox200706_09.pdf.

Ehrenberg, Ronald G., and Robert S. Smith. *Modern Labor Economics: Theory And Public Policy*. New York: Pearson Education, Inc, 2003.

Enironmental Crime Programme. "Guide to Carbon Trading Crime," June 2013. https://www.interpol.int/content/download/5172/file/Guide%20to%20Carbon%20Trading%20Crime.pdf.

Hakim, Lukman Nur. "Ada Bursa Karbon, MIND ID: Langkah Tepat Percepat Dekarbonisasi." Ekonomi Bisnis, October 5, 2023. https://ekonomi.bisnis.com/read/20240723/44/1784586/esdm-146-pltu-ikut-perdagangan-karbon-di-2024-naik-dari-2023.

———. "ESDM: 146 PLTU Ikut Perdagangan Karbon Di 2024, Naik Dari 2023." Kementerian Energi dan Sumber Daya Mineral, July 23, 2024. https://ekonomi.bisnis.com/read/20240723/44/1784586/esdm-146-pltu-ikut-perdagangan-karbon-di-2024-naik-dari-2023.

Hayes, Adam. "Volatility: Meaning in Finance and How It Works With Stocks." Investopedia, July 3, 2024. https://www.investopedia.com/terms/v/volatility.asp.

Hema, Yuliana. "BEI Perpanjang Berbagai Insentif Untuk Mendongkrak Bursa Karbon Indonesia." kontan.co.id, October 3, 2024. https://investasi.kontan.co.id/news/bei-perpanjang-berbagai-insentif-untuk-mendongkrak-bursa-karbon-indonesia.

IDXCarbon. "IDXCarbon Daily Trading," September 30, 2024. https://idxcarbon.co.id/id/data-daily.

———. "IDXCarbon Monthly Report August 2024," August 2024. https://www.idxcarbon.co.id/document/share/68/2cea4a16-2f05-4cd9-a5bd-cbfcd6ff9f2f.

———. "IDXCarbon Monthly Report July 2024," July 2024. https://www.idxcarbon.co.id/document/share/67/ea9cd68d-ebd1-4b9b-94e2-3b39fbff37f9.

———. "IDXCarbon Monthly Report June 2024," June 2024. https://www.idxcarbon.co.id/document/share/64/59b63385-5eb8-4e0c-9120-9cb52dbc42d5.

———. "IDXCarbon Monthly Report May 2024," May 2024. https://www.idxcarbon.co.id/document/share/63/ed08b7f4-8427-461f-b073-43889e2c68da.

———. "IDXCarbon Monthly Report September 2024," September 2024. https://www.idxcarbon.co.id/document/share/71/7522c981-1e89-42fa-bf0f-043ce205a745.

———. "IDXCarbon Monthly Report September 2024," September 2024. https://www.idxcarbon.co.id/document/share/71/7522c981-1e89-42fa-bf0f-043ce205a745.

———. "IDXCarbon Monthly Report Volume 1, January 2024," January 2024. https://www.idxcarbon.co.id/document/share/52/ae3f4af3-e4ef-4479-8257-20ae66e6995e.

———. "IDXCarbon Monthly Report Volume 1, January 2024," January 2024. https://www.idxcarbon.co.id/document/share/52/ae3f4af3-e4ef-4479-8257-20ae66e6995e.

———. "IDXCarbon Monthly Report Volume 2, February 2024," February 2024. https://www.idxcarbon.co.id/document/share/54/dfb9f1b5-6880-4b60-b6ea-e0820ead374f.

———. "IDXCarbon Monthly Report Volume 3, March 2024," March 2024. https://www.idxcarbon.co.id/document/share/57/ff19dc18-9f96-422c-ae09-d65708ddb5c6.

———. "IDXCarbon Monthly Report Volume 4, April 2024," April 2024. https://www.idxcarbon.co.id/document/share/59/4013bb8b-95d5-48b9-b53c-2c433bff9918.

———. "Setting Your Sail on The Indonesia Carbon Trading Ecosystem," n.d. https://idxcarbon.co.id/id.

Indonesia Green Growth Program. "Updated NDC Indonesia Untuk Masa Depan Yang Tangguh Iklim," September 23, 2021. http://greengrowth.bappenas.go.id/updated-ndc-indonesia-untuk-masa-depan-yang-tangguh-iklim/.

Indonesia Stock Exchange. "Bursa Karbon Indonesia (IDXCarbon) Resmi Diluncurkan," September 26, 2023. https://www.idx.co.id/id/berita/siaran-pers/2016.

———. "Bursa Karbon Indonesia (IDXCarbon) Resmi Diluncurkan," September 26, 2023. https://www.idx.co.id/id/berita/siaran-pers/2016.

International Carbon Action Partnership (ICAP). "Emissions Trading Worldwide Status Report 2023," 2023. https://icapcarbonaction.com/system/files/document/ICAP%20Emissions%20Trading%20Worldwide%202023%20Status%20Report_0.pdf.

Jatim Newsroom. "Gubernur Khofifah Apresiasi Gudang Biomassa PT Ajinomoto Dan Dorong Percepatan Transisi Energi." Dinas Kominfo Provinsi Jawa Timur, January 12, 2024. https://kominfo.jatimprov.go.id/berita/gubernur-khofifah-apresiasi-gudang-biomassa-pt-ajinomoto-dan-dorong-percepatan-transisi-energi.

John, Mathew. "A False Shade of Green: Criminal Contours of Carbon Trading." Linkedin, May 25, 2023. https://www.linkedin.com/pulse/false-shade-green-criminal-contours-carbon-trading-mathew-john/.

Jong, Hans Nicholas. "Indonesia Opens Carbon Trading Market to Both Skepticism and Hope." Mongabay, October 12, 2023. https://news.mongabay.com/2023/10/indonesia-opens-carbon-trading-market-to-both-skepticism-and-hope/.

Kementerian Energi dan Sumber Daya Mineral. "Menteri ESDM Luncurkan Perdagangan Karbon Subsektor Pembangkit Listrik," February 22, 2023. https://www.esdm.go.id/id/media-center/arsip-berita/menteri-esdm-luncurkan-perdagangan-karbon-subsektor-pembangkit-listrik.

———. "Transaksi Perdagangan Karbon Tahun 2023 Capai Rp84 Miliar," July 23, 2024. https://esdm.go.id/id/media-center/arsip-berita/transaksi-perdagangan-karbon-tahun-2023-capai-rp84-miliar.

Kementerian Lingkungan Hidup dan Kehutanan Direktorat Jenderal Pengendalian Perubahan Iklim. "User Manual Sistem Registri Nasional Pengendalian Perubahan Iklim," November 2016. https://srn.menlhk.go.id/static/srn/PDF/fin_manual_srn_publik.pdf .

Kementerian Lingkungan Hidup dan Kehutanan Pejabat Pengelola Informasi dan Dokumentasi. "Enhanced NDC: Komitmen Indonesia Untuk Makin Berkontribusi Dalam Menjaga Suhu Global," n.d. https://ppid.menlhk.go.id/berita/siaran-pers/6836/enhanced-ndc-

komitmen-indonesia-untuk-makin-berkontribusi-dalam-menjaga-suhu-global.

Khadafi, Muhammad. "Setelah Dibuka Jokowi, Transaksi Bursa Karbon Kok Sepi?" CNBC Indonesia, October 5, 2023. https://www.cnbcindonesia.com/market/20231005151441-17-478206/setelah-dibuka-jokowi-transaksi-bursa-karbon-kok-sepi.

Komite Akreditasi Nasional. "Syarat Dan Aturan Akreditasi Lembaga Penilaian Kesesuaian," January 2, 2019. https://kan.or.id/unduh/NewKAN/KAN%20U-01%20Syarat%20dan%20Aturan%20Akreditasi%20LPK.pdf.

Kumparan Bisnis. "BEI: Transaksi Bursa Karbon RI Lebih Tinggi Dibandingkan Di Malaysia Dan Jepang," October 3, 2024. https://kumparan.com/kumparanbisnis/bei-transaksi-bursa-karbon-ri-lebih-tinggi-dibandingkan-di-malaysia-dan-jepang-23e2QXiaKhI.

Magang Alam LindungiHutan. "Greenwashing, Strategi Green Marketing Yang Harus Dihindari." LindungiHutan, February 9, 2023. https://lindungihutan.com/blog/pengertian-greenwashing-dan-contoh-kasusnya/.

Mentari, Nikmah, Ilham Dwi Rafiqi, and Tiara Zein. "Implementasi Pengaturan Perdagangan Karbon Di Indonesia Dalam Perspektif Investasi Hijau Dan Konstitusi Ekonomi." *JATISWARA* 39, no. 3 (November 2024): 283–94. https://jatiswara.unram.ac.id/index.php/js/article/view/710.

MetroTVNews. "Potensi Besar Carbon Trading Di Indonesia," May 13, 2024. https://www.metrotvnews.com/play/N9nCn16D-potensi-besar-carbon-trading-di-indonesia.

Ministry of Energy and Mineral Resources. "99 Unit PLTU Ditargetkan Ikuti Perdagangan Karbon Tahun Ini," March 13, 2023. https://www.esdm.go.id/en/berita-unit/directorate-general-of-electricity/99-unit-pltu-ditargetkan-ikuti-perdagangan-karbon-tahun-ini.

Muhammad, Abdul Kadir. *Hukum Dan Penelitian Hukum*. Bandung: PT Citra Aditya Bakti, 2004.

Nabila, Nur Hana Putri. "Setahun Didirikan, Transaksi Bursa Karbon Indonesia Lampaui Jepang." katadata, October 3, 2024. https://katadata.co.id/ekonomi-hijau/investasi-hijau/66fe7ad4e8125/setahun-didirikan-transaksi-bursa-karbon-indonesia-lampaui-jepang.

O'Hara, Maureen. *Market Microstructure Theory*. New Jersey: Willey, 1998.

Pertamina. "Emisi Gas Rumah Kaca," n.d. https://www.pertamina.com/Id/ghg-emission.

PT Austindo Nusantara Jaya Tbk. "Pengurangan Emisi GRK." ANJ, December 31, 2023. https://www.anj-group.com/id/emisi-gas-rumah-kaca.

PT Bank Negara Indonesia (Persero) Tbk. "Moving Towards A Sustainable Future | Laporan Keberlanjutan 2023," 2024. https://www.bni.co.id/Portals/1/BNI/Perusahaan/HubunganInvestor/Docs/SR-BNI-2023-INA-final_highres.pdf.

PT BUMI Resources Tbk. "Laporan Keberlanjutan 2023," April 30, 2024. https://www.bumiresources.com/sustainability/reports.

Purwantono, Iwan. "Founder BGK Ingatkan Tingginya Potensi Fraud Di Bursa Karbon." inilah.com, October 26, 2023. https://www.inilah.com/founder-bgk-ingatkan-tingginya-potensi-fraud-di-bursa-karbon.

Putri, Restu Diantina. "Bursa Karbon, Potensi Triliunan & Ancaman Proyek Bodong." tirto.id, October 11, 2023. https://tirto.id/bursa-karbon-potensi-triliunan-rupiah-ancaman-proyek-bodong-gQVv#google_vignette.

Quantitative Brokers. "What Is Market Microstructure?," November 2022. https://www.quantitativebrokers.com/blog/what-is-market-microstructurenbsp.

Rajendra, Rizqi. "OJK Akui Transaksi Bursa Karbon Masih Minim, Ini Strateginya." Market Bisnis, March 19, 2024. https://market.bisnis.com/read/20240319/7/1750851/ojk-akui-transaksi-bursa-karbon-masih-minim-ini-strateginya.

Risalah, Dian Fath. "Jauh Dari Potensi, Akumulasi Transaksi Bursa Karbon Baru Mencapai Rp 36,79 Miliar." Republika, July 8, 2024. https://esgnow.republika.co.id/berita/sgbb0w490/jauh-dari-potensi-akumulasi-transaksi-bursa-karbon-baru-mencapai-rp-3679-miliar.

Scherger, Sophie. "EU's Double Standards on Double Counting." Institute for Agriculture & Trade Policy, December 4, 2023. https://www.iatp.org/eus-double-standards-double-counting.

Senken. "Understanding Nature Carbon Credits," n.d. https://www.senken.io/academy/understanding-carbon-credits.

Sudaryanto, Chandra Widi, and Sri Rahayu Tri Astuti. "Analisis Pengaruh Kualitas Produk, Kualitas Pelayanan, Dan Kinerja Perusahaan Terhadap Kepuasan Pelanggan." *Diponegoro Journal of Management* 6, no. 1 (2017): 49–58. https://doi.org/https://ejournal3.undip.ac.id/index.php/djom/article/view/17520.

Supriati, Putu Ayu, and Ni Luh Putu Wiagustini. "Pengaruh Volume Perdagangan Terhadap Volatilitas (Studi Pada Bursa Efek Indonesia Dan New York Stock Exchange)." *E-Jurnal Manajemen Universitas Udayana* 8, no. 4 (2019): 2438–65. https://doi.org/10.24843/EJMUNUD.2019.v08.i04.p20.

The Economic Times. "What Is 'Volatility,'" n.d. https://economictimes.indiatimes.com/definition/volatility.

Tim CNBC Indonesia. "Apa Itu Perubahan Iklim, Penyebab, Dampak & Cara Mengatasinya." CNBC Indonesia, July 4, 2022. https://www.cnbcindonesia.com/tech/20220704142800-37-352764/apa-itu-perubahan-iklim-penyebab-dampak-cara-mengatasinya.

Unilever. "90 Tahun Dedikasi Bagi Tanah Air Yang Sehat, Sejahtera Dan Lestari | Laporan Keberlanjutan Sustainability Report 2023," April 30, 2024. https://www.unilever.co.id/files/92ui5egz/production/b09b866ad741012ce8bf771fb3368ee219d98980.pdf.

United Nations. "Penyebab Dan Dampak Perubahan Iklim | Perserikatan Bangsa - Bangsa Di Indonesia," March 18, 2022. https://indonesia.un.org/id/175273-penyebab-dan-dampak-perubahan-iklim.

WALHI. "Kertas Posisi WALHI Perdagangan Karbon: Jalan Sesat Atasi Krisis Iklim." Walhi, August 8, 2023. https://www.walhi.or.id/kertas-posisi-walhi-perdagangan-karbon-jalan-sesat-atasi-krisis-iklim.

Wirjono, Endang Raino. "Tingkat Kesadaran Pelaku Usaha Dalam Implementasi Pertanggungjawaban Sosial (Corporate Social Responsibility." *Conference in Business, Accounting, and Management (CBAM)* 1, no. 1 (2012): 201–13. https://doi.org/https://jurnal.unissula.ac.id/index.php/cbam/article/view/134/110#.

Zahira, Nadya. "Celios Ungkap Cara Agar Bursa Karbon Tak Jadi Praktik Greenwashing." katadata.co.id, October 4, 2023. https://katadata.co.id/ekonomi-hijau/energi-baru/651d7ca238bf9/celios-ungkap-cara-agar-bursa-karbon-tak-jadi-praktik-greenwashing.

Zahra, Amara. "Perdagangan Karbon Masih Sulit Untuk Pelaku Usaha, Ini Sebabnya." IDNTimes, March 20, 2024. https://www.idntimes.com/business/economy/amara-zahra/perdagangan-karbon-masih-sulit-untuk-pelaku-usaha-ini-sebabnya?page=all.

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