

## Carbon Credits and Compliance: Assessing Indonesia's Progress on Article 6.2 Implementation (2019–2023)

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### Abstract

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Indonesia is positioning itself as a key actor in international carbon markets under Article 6.2 of the Paris Agreement, which enables the transfer of carbon credits through Internationally Transferred Mitigation Outcomes (ITMOs). This study employs a mixed-methods approach, combining policy analysis with emissions data from 2019 to 2023, to evaluate Indonesia's readiness and progress in implementing Article 6.2. During this period, Indonesia's greenhouse gas (GHG) emissions averaged 1,117.82 MtCO<sub>2e</sub>, peaking at 1,200.20 MtCO<sub>2e</sub> in 2023 well below the 2030 unconditional cap of 1,954.76 MtCO<sub>2e</sub> and significantly lower than the Business-as-Usual (BAU) projection of 2,869 MtCO<sub>2e</sub>. Despite this, a linear upward trend in annual emissions was observed, indicating that emissions are gradually increasing over time and may approach the target cap if not addressed. While policy frameworks such as Presidential Decree No. 98/2021 provide foundational support, Indonesia still faces technical and institutional capacity gaps. The findings suggest that although current emissions remain within target levels, the rising trend underscores the urgency for more robust and accelerated mitigation efforts to ensure long-term compliance with climate commitments.

#### Abstrak

Indonesia tengah memposisikan diri sebagai aktor kunci dalam pasar karbon internasional melalui skema Pasal 6.2 Perjanjian Paris, yang memungkinkan perdagangan kredit karbon melalui *Internationally Transferred Mitigation Outcomes* (ITMOs). Studi ini menggunakan pendekatan campuran, yaitu analisis kebijakan dan data emisi gas rumah kaca (GRK) periode 2019 hingga 2023, untuk mengevaluasi kesiapan dan kemajuan implementasi Indonesia terhadap Pasal 6.2. Selama periode tersebut, emisi GRK Indonesia rata-rata sebesar 1.117,82 MtCO<sub>2e</sub>, dengan puncaknya sebesar 1.200,20 MtCO<sub>2e</sub> pada tahun 2023—masih berada di bawah batas target tanpa syarat tahun 2030 sebesar 1.954,76 MtCO<sub>2e</sub>, serta jauh lebih rendah dari proyeksi skenario *Business-as-Usual* (BAU) sebesar 2.869 MtCO<sub>2e</sub>. Meskipun demikian, tren linier peningkatan emisi tahunan menunjukkan bahwa emisi terus meningkat dan berpotensi mendekati batas target apabila tidak diintervensi. Meskipun kerangka kebijakan seperti Peraturan Presiden No. 98 Tahun 2021 telah memberikan landasan awal, tantangan dalam kapasitas teknis dan kelembagaan masih menjadi hambatan. Temuan ini menunjukkan bahwa meskipun emisi saat ini masih dalam batas target, tren kenaikan tersebut menandakan urgensi untuk memperkuat dan mempercepat upaya mitigasi agar kepatuhan jangka panjang terhadap komitmen iklim dapat terjamin..

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## A. INTRODUCTION

Indonesia is among the world's largest emitters of greenhouse gases (GHGs), primarily due to emissions from the forestry, land-use change, and energy sectors. As part of its climate commitment, Indonesia has pledged to reduce its GHG emissions by 29% unconditionally and up to 41% with international support by 2030<sup>1</sup>. To achieve these targets, the government has adopted carbon market mechanisms as a key component of its mitigation strategy. Article 6.2 of the Paris Agreement enables bilateral cooperation through the transfer of mitigation outcomes known as Internationally Transferred Mitigation Outcomes (ITMOs) allowing countries like Indonesia to access climate finance and technology in exchange for verified emission reductions. These ITMOs contribute toward the achievement of each country's Nationally Determined Contributions (NDCs), reinforcing collaborative efforts to address climate change<sup>2</sup>.

To facilitate the transition to this new trading mechanism, certain Certified Emission Reductions (CERs) generated between 2013 and 2020 may be converted into ITMOs, provided they meet eligibility criteria. Despite the potential of Article 6.2, operationalizing its provisions has proven challenging. While initial guidance was agreed upon at the first UNFCCC Conference of the Parties in 2015, the details of Article 6 implementation remained ambiguous. It was not until the Glasgow Climate Conference in 2021 that parties formally adopted a comprehensive rulebook outlining procedures for operationalizing Article 6, thereby providing a clearer framework for future cooperation.

As previously mentioned, Indonesia has committed to reducing its greenhouse gas (GHG) emissions by 31.82% unconditionally, and by up to 43.20% with international support, by 2030. These targets are managed by the Ministry of Environment and Forestry (MoEF) through the National Registry System for Climate Change Control (*Sistem Registri Nasional Pengendalian Perubahan Iklim* or SRN-PPI). Furthermore, Indonesia aims to achieve net-zero emissions by 2060, as outlined in the Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR 2050)<sup>3</sup>. This commitment is reflected in a range of policies promoting renewable energy, forest conservation, and sustainable land use.

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<sup>1</sup> UNFCCC. (2022). *UN Climate Change Annual Report 2020*, pp. 11–17: Overview of progress, transparency framework, and Article 6 engagement.

<sup>2</sup> Government of Indonesia. (2022). *Enhanced Nationally Determined Contribution (ENDC)*. Ministry of Environment and Forestry, pp. 4–10: National targets, NDC breakdowns, Article 6.2 role in GHG mitigation.

<sup>3</sup> Government of Indonesia. (2021). *Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050)*, pp. 12–20: National net-zero targets and roadmap to 2060.

One of the key instruments in this strategy is the *Carbon Economic Value (Nilai Ekonomi Karbon* or NEK), which integrates the economic cost of carbon emissions into national development planning. This policy framework encourages the adoption of low-carbon technologies and facilitates carbon pricing mechanisms. NEK is implemented under Presidential Regulation No. 98 of 2021<sup>4</sup>, which establishes a carbon pricing framework and emissions reduction pathways, initially targeting the electricity and forestry sectors, with plans to expand to other sectors such as industry, agriculture, and waste management. Through the NEK framework, companies can engage in domestic carbon trading by generating and transacting carbon credits, thereby laying the foundation for a national carbon market<sup>5</sup>.

A carbon credit represents a tradable certificate that permits the emission of one metric ton of carbon dioxide or its equivalent in other GHGs. These credits are issued and monitored by regulatory bodies that oversee compliance markets typically within a cap-and-trade system. In such systems, entities covered by the regulation are legally required to hold a sufficient number of credits to match their emissions. Entities that emit less than their allocated allowance can sell surplus credits to those exceeding their limits. Over time, the total emissions cap is usually lowered to encourage greater reductions. Carbon credits are primarily traded within regulated markets<sup>6</sup>.

### **A.1. Internationally Transferred Mitigation Outcomes (ITMOs) and Authorisations**

Article 6.2 of the Paris Agreement provides a framework for voluntary international cooperation in reducing greenhouse gas emissions through the transfer of emission reductions, referred to as *Internationally Transferred Mitigation Outcomes (ITMOs)*. Participation in such cooperative approaches requires each country to establish formal arrangements for authorising the use of ITMOs, as mandated by the decisions adopted at The 2021 United Nations Climate Change Conference (COP26)<sup>7</sup>. This authorisation ensures that countries are officially committed to transferring or using ITMOs in line with internationally agreed rules and accounting principles.

Crucially, the guidance under Article 6.2 does not prescribe a one-size-fits-all model for how countries should establish their authorisation systems. Instead, it allows flexibility, enabling Parties to design their procedures in accordance with their domestic regulatory frameworks and

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<sup>4</sup> Government of Indonesia. (2021). *Presidential Regulation No. 98/2021 on the Implementation of Carbon Economic Value. Articles 10, 14, 36, 56–59: Key sections used for MRV, CA, sustainability, and SRN.*

<sup>5</sup> PwC Indonesia. (2024). *Transparency report 2024, pp. 12–14: Transparency indicators and NEK implementation.*

<sup>6</sup> Mintz. (2022). *Carbon Credit and Carbon Offset Fundamentals, pp. 2–5: Carbon credit basics, compliance vs voluntary markets.*

<sup>7</sup> UNFCCC. (2021). *The Glasgow Climate Pact – Key outcomes from COP26, pp. 6–9: Finalisation of Article 6 guidelines (especially 6.2 and 6.4 mechanisms).*

institutional capacities. Each participating Party in a cooperative approach must authorise the use of ITMOs, and this authorisation must be reflected in the submission of an *Initial Report* (IR). Although the guidance does not explicitly state that all Parties must authorise cooperation individually, the requirement for IR submissions from each participating Party implies that mutual or separate authorisations are necessary for transparency and consistency.

Countries may authorise ITMOs for two primary purposes: (i) to contribute toward achieving their *Nationally Determined Contributions* (NDCs), or (ii) for *Other International Mitigation Purposes* (OIMP), such as contributions to climate finance or voluntary corporate targets. The type of authorisation has direct implications for international emissions accounting. When ITMOs are authorised for either NDC or OIMP uses, the first transferring Party is required to apply a corresponding adjustment to its emissions inventory to ensure the emission reduction is not double counted. This adjustment acknowledges that the mitigation outcome has been transferred and can no longer be claimed toward the transferring Party's own NDC. In the case of OIMP uses, the corresponding adjustment can be applied at various stages during authorisation, issuance, or at the time of actual use depending on the national policy of the transferring country. Conversely, ITMOs that are transferred without formal authorisation for NDC or OIMP uses do not require a corresponding adjustment, as the mitigation outcomes are not intended for international accounting under Article 6.2.

The Article 6.2 framework also allows for multiple forms of cooperation. These include bilateral agreements between two countries, collaborations involving non-Party stakeholders such as private companies, and multilateral arrangements that involve several buying and selling countries. While this flexibility encourages broader participation, multilateral cooperation can present additional complexity. In such cases, differing standards and expectations among multiple acquiring countries may make it difficult for the transferring Party to satisfy all conditions within a single authorisation document. As a result, effective coordination and transparent documentation become critical for the success and integrity of these cooperative approaches.

Despite the availability of detailed guidance under Article 6.2, significant gaps and ambiguities remain in its practical implementation. One key issue concerns whether ITMOs can be authorised solely for *Other International Mitigation Purposes* (OIMP) without being linked to a country's Nationally Determined Contribution (NDC). Although some countries, particularly EU member states, have already begun authorising ITMOs for OIMP uses, the lack of explicit rules has raised questions about the consistency and transparency of this approach. Another area of uncertainty relates to the scope of authorisation responsibilities specifically, whether only the first

transferring Party must authorise the use of ITMOs, or if the acquiring and re-transferring Parties must also provide formal authorisation. While current guidance confirms that the first transferring Party is responsible for authorisation due to its obligation to apply the corresponding adjustment, the acquiring Party's authorisation remains optional, and the status of re-transferring Parties is yet to be clarified<sup>8</sup>.

Authorisation is closely linked to reporting obligations, which serve as a cornerstone for transparency and accountability in Article 6.2 implementation. Each Party must submit an Initial Report (IR) at the time of authorising ITMOs. However, the guidance remains vague as to whether the IR pertains to the cooperative approach as a whole or to the specific ITMOs intended for use under the agreement. Following the submission of the IR, countries are required to provide updates through Annual Information (AI) reports and Regular Information (RI), which are submitted as part of Biennial Transparency Reports (BTRs). These documents must also capture any changes to previously issued authorisations to ensure ongoing alignment with accounting rules and procedural integrity.

Furthermore, when a Party authorises non-state actors—such as private companies—to engage in ITMO transactions, it must include the names of these entities in its official reports. Although the Article 6.2 guidance does not explicitly define the roles, responsibilities, or due diligence requirements for these authorised entities, it clearly permits their participation, particularly for ITMOs intended for international mitigation purposes. This inclusion underscores the growing role of the private sector in global climate governance. Overall, while Article 6.2 lays out foundational procedures for international cooperation through carbon markets, several critical aspects—such as authorisation chains, reporting precision, and third-party engagement—remain open to interpretation. As a result, countries retain considerable discretion in how they operationalise their authorisation, accounting, and reporting frameworks<sup>9</sup>.

## **A.2. The Indonesian Carbon Exchange, Carbon Market and Statutory**

On September 26, 2023, the Indonesian Stock Exchange introduced the Indonesia Carbon Exchange (“IDX Carbon”). This marked an important move in Indonesia's goal to reach net zero emissions by 2060, aided by the establishment of a voluntary carbon market. This step is a start for Indonesia's developing carbon market, which is essential for reaching its climate objectives. Important actors, such as government agencies, banks, regulatory bodies, private businesses, and

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<sup>8</sup> UNFCCC. (2024). *Article 6.2 Reference Manual (Version 2)*, pp. 9–14: ITMO authorisation, corresponding adjustment and reporting.

<sup>9</sup> Climate Change Expert Group (CCEG). (2022). *Operationalizing Article 6 of the Paris Agreement: Options for reporting ITMOs*. OECD & IEA, pp. 5–10: Authorisation and accounting procedures; tables referenced in ITMO policy analysis.

non-governmental organizations (NGOs), are crucial for making sure the market works well and remains sustainable. As of October 12, 2023, IDXCcarbon has logged transactions totalling 459,970 (tonCO<sub>2</sub>e) equivalent. This amount is much greater than the 166,500 (tonCO<sub>2</sub>e) equivalent in transactions recorded by Malaysia's Carbon Exchange since it started in March 2023 until October 2023.

IDXCcarbon operates under a strong legal foundation, guided by Law No. 4/2023 on Financial Sector Development and Reinforcement<sup>10</sup>, OJK Regulation No. 14/2023 regarding Carbon Trading via Carbon Exchange, and Circular Letter OJK No. 12/04/2023 detailing the Procedures for Carbon Exchange<sup>11</sup>. Based on these regulations, IDXCcarbon offers four different trading mechanisms. In an Auction, potential buyers place bids indicating how many carbon units they want and the price they are ready to pay. Then, the carbon units are sold to the highest bidders. Regular Trading functions through a constant auction system that allows everyone involved to submit their buying and selling proposals at any moment. Negotiated Trading, for trades that have been arranged in advance outside of the system. Then Marketplace where owners of Emission Mitigation Projects can sell their carbon units at a set price, allowing them to have more control over how they sell their products. Their teamwork leads to lower emissions, encourages the development of green technology, and helps meet environmental regulations<sup>12</sup>.

The Indonesian Business Council in their December 2023 report also stated that it is important to fully understand carbon credit certifications according to global issuance standards. This knowledge is crucial for creating a lively and competitive market on a global scale. The goal is to gain useful lessons and insights from these standards that can help in the continuous effort to assess and improve Indonesia's creditworthiness and regulatory standards. Four of the renowned global certification standards that must be known include the Integrity Council for the Voluntary Carbon Market (ICVCM), Verra's Verified Carbon Standard (VCS), The Gold Standard, and the American Carbon Registry Standard.

In Indonesia, carbon units come in two types: the *Petunjuk Teknis Batas Atas Emisi Pelaku Usaha* (PTBAE-PU) and the *Sertifikat Pengurangan Emisi Gas Rumah Kaca* (SPE-GRK)<sup>13</sup>. The OJK

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<sup>10</sup> Government of Indonesia. (2023). *Law No. 4/2023 on Development and Strengthening of the Financial Sector. Relevant for enabling IDXCcarbon legality.*

<sup>11</sup> Government of Indonesia. (2023). *Government Regulation No. 12/04/2023. Cited as statutory basis for investment frameworks.*

<sup>12</sup> Indonesian Business Council. (2024). *Preparing a globally competitive carbon market in Indonesia, pp. 5–7: Voluntary carbon market certification (ICVCM, VCS, ACR, GS), market infrastructure.*

<sup>13</sup> Hukumonline. (2021). *10 Artikel Hukum Terpopuler Sepanjang 2021. Referenced in context of legal and regulatory awareness.*

Regulation describes PTBAE-PU as setting a maximum limit on greenhouse gas emissions for businesses and/or establishing emission quotas that businesses must follow during a specific required timeframe. At the same time, SPE-GRK serves as a document that proves how much businesses and activities have reduced their emissions. This proof comes from a process of measuring, reporting, and verifying their efforts, and it is documented in the *Sistem Registri Nasional Pengendalian Perubahan Iklim* (SRN PPI) as a number or registry code.

The appropriate ministry sets the PTBAE-PU limits by using current maps of emission limit technologies. Once businesses have calculated and confirmed their emissions, they can trade carbon credits according to their PTBAEPU status. When actual emissions fall below the PTBAE-PU limit, companies can request SPE-GRK certificates from the Indonesian Ministry of Environment and Forestry. After PTBAEPU and SPE-GRK are created and released, they will be included on the SRN PPI and the Carbon Exchange Organizer, which is part of the secondary market. All carbon units must be logged in the national system before they can be traded, whether directly or indirectly. In the indirect trading of carbon units, IDXCarbon serves as the middleman, facilitating transactions between companies that are buying and selling<sup>14</sup>.

### **A.3. Crediting Mechanisms under Article 6.2**

Crediting schemes are a key method used in the market to help lower greenhouse gas emissions. Crediting is a process that measures and recognizes the decrease in emissions resulting from particular project activities. Essentially, the reductions are determined by finding the difference between the emissions created by the project and the emissions that would have occurred if things had continued as usual (BAU), without the project or initiative being put in place. This baseline scenario provides a way to compare and evaluate how effective the efforts to reduce emissions are. According to the accounting rules, carbon credits are created through crediting mechanisms. Each carbon credit represents the reduction of one ton of CO<sub>2</sub> equivalent (this reduction can come from cutting emissions, capturing them, or in some cases, preventing them from happening).

Carbon credits can be created from various activities, including renewable energy projects, enhancing energy efficiency, managing waste, destroying industrial gases, capturing and storing (CO<sub>2</sub>), protecting forests, and planting new trees through afforestation and reforestation, among

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<sup>14</sup> Dima, H. M., & Adjani, W. K. (2024). *Building a robust international carbon crediting framework: Insights from Indonesia's Joint Crediting Mechanism*. *IOP Conference Series: Earth and Environmental Science*, 1395(1), 012030. <https://doi.org/10.1088/1755-1315/1395/1/012030>, pp. 2–4: Framework description of SPE-GRK, SRN-PPI and registry structure.

other actions. Typically, actions that create carbon credits are closely monitored and verified to make sure that every credit truly reflects the reduction or removal of one ton of carbon dioxide equivalent (tCO<sub>2</sub>e). Furthermore, they are assessed based on certain standards to guarantee the quality of carbon credits is high. These criteria focus on measuring the actual results of mitigation efforts. They include showing that the project has additional benefits, using a strong crediting baseline, applying a dependable monitoring method, having a third party validate the project design beforehand, and having a third party verify the results afterward. Additionally, they address issues like non-permanence, leakage, and preventing double counting<sup>15</sup>.

Carbon credits have several purposes. They can help fulfil compliance needs set by international agreements, meet domestic reduction targets, or be used voluntarily to offset greenhouse gas emissions. This method has been widely adopted by private companies and individuals who purchase carbon credits at market prices, as issued by various crediting standards. This led to the development and rise of the voluntary carbon market<sup>16</sup>. Crediting standards are regulatory bodies that aim to maintain the environmental quality of carbon credits<sup>17</sup>. Additionally, they engage in tasks like approving methods, accrediting organizations that validate and verify, and managing a carbon registry for activities that have received approval and for the carbon credits that have been issued. These standards can be managed by various organizations, including independent groups, international bodies, bilateral agreements, regional authorities, national governments, or local entities. In the last twenty years, many different crediting standards have come into existence. Some examples of independent standards (*mentioned above in 1.2 The Indonesia Carbon Exchange, Carbon Market and Statutory*) are the Gold Standard for the Global Goals (GS4GG), Verified Carbon Standard (VCS), VERRA, Carbon Action Reserve (CAR), and the American Carbon Registry (ACR). On the other hand, there are standards meant for compliance, such as the Clean Development Mechanisms (CDM) and the Joint Implementation (JI) under the Kyoto Protocol.

It's important to note that carbon credits go by various names based on the standards under which they are issued. For example, in the CDM, the carbon credits that are issued are known as Certified Emissions Reductions (CERs). In the voluntary carbon market, Gold Standard produces Verified Emission Reductions (VERs), while VERRA creates Verified Carbon Units (VCUs). Within the framework of the Paris Agreement, carbon credits are categorized as mitigation

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<sup>15</sup> Ahonen, H., et al. (2021). *Crediting mechanisms under Article 6.2: Ensuring integrity and transparency. Partnership for Market Readiness*, pp. 7–12: *Used for criteria like additionality, monitoring, and double counting.*

<sup>16</sup> International Emissions Trading Association (IETA). (2023). *The rise of the voluntary carbon market*, pp. 6–9: *VCM structure, private sector involvement.*

<sup>17</sup> Michaelowa, A., et al. (2019). *Crediting standards and environmental integrity: The role of the voluntary carbon market. Climate Policy*, 19(9), 1091–1104. <https://doi.org/10.1080/14693062.2019.1614656>, pp. 1092–1100: *Role of Verra, Gold Standard, and environmental safeguards.*

outcomes, ITMOs, or Article 6.4 on Emission Reduction (A6.4ERs) This classification depends on the market mechanism that produces them and their approval status. Along with offering a budget-friendly way to cut down or eliminate emissions, these methods also channel financial support into important projects and activities aimed at reducing environmental impact. Additionally, mitigation efforts can bring extra advantages that help foster sustainable development in the country or region where they take place<sup>18</sup>.

However, these systems also face challenges. Accurately measuring emission reductions can be difficult, which may lead to assigning credits for reductions that didn't really happen. This can weaken the system's effectiveness and its role in fighting climate change<sup>19</sup>. Another problem is leakage, which happens when reducing emissions in one area unintentionally leads to a rise in emissions in another location. Finally, the lasting impact of certain reductions, particularly those related to forestry initiatives, might be uncertain<sup>20</sup>.

## **B. RESEARCH METHOD**

This research adopts a mixed-method approach, combining quantitative and qualitative. The quantitative analysis uses descriptive statistics and scatter plot tools through JASP statistical software to identify whether emission levels have been increasing, decreasing, or stabilizing over the five-year period from 2019 to 2023, and to determine if these levels have surpassed the baseline cap of 1.954757 MtCO<sub>2e</sub> (Unconditional) set under Article 6.2 of the Paris Agreement. This cap is compared against Indonesia's Business as Usual (BAU) scenario, which projects emission levels assuming no intervention or policy changes; under the BAU, Indonesia's GHG emissions are expected to rise significantly by 2030. Meanwhile, the qualitative analysis draws on secondary data, including government policy documents, official reports, and international agreement frameworks, to explore the institutional, regulatory, and strategic factors shaping Indonesia's emission performance and its readiness to fulfill its climate obligations.

## **C. RESULT AND DISCUSSION**

In the results and analysis, two (2) key areas are analyzed and presented. They include from a policy driven standpoint under established policy outcomes for ITMO authorization and a measure of Indonesia's greenhouse gas (GHG) emission figures from 2019, 2021 (when

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<sup>18</sup> Partnership for Market Readiness. (2021). *Crediting mechanisms for Article 6 of the Paris Agreement*. World Bank Group, pp. 15–22: *Crediting cycle, baseline methodology, mitigation outcomes*.

<sup>19</sup> Espejo, C., et al. (2020). *Challenges in measuring emission reductions in carbon markets*. *Climate Policy*, 20(7), 812–826. <https://doi.org/10.1080/14693062.2020.1773758>, pp. 813–820: *Limitations of verification and non-permanence in carbon credit schemes*.

<sup>20</sup> Van Oosterzee, P., et al. (2012). *Uncertainty and permanence in forestry carbon credits*. *Ecological Management & Restoration*, 13(1), 68–73, pp. 69–72: *Permanence risks and leakage in forestry-based carbon projects*.

Presidential Decree 98/2021 was introduced) to 2023 track whether they will reflect Indonesia's emission reduction target of 31.82% by 2030 under Indonesia's overall green-house gas (CO<sub>2</sub>) emission levels per metric-tons of carbon dioxide equivalent (tCO<sub>2</sub>e). Internationally Transferred Mitigation Outcomes (ITMOs) are analysed based on a set of criteria established under Article 6.2 of the Paris Agreement, and further clarified by decisions from the Conference of the Parties (COP). These include the Katowice Rulebook (2018) and the Glasgow Climate Pact (2021)<sup>21</sup>.

### **C.1. Established Policy Outcomes for ITMO Authorization**

**1. Environmental Integrity;** One of the foundational principles of ITMO implementation is the assurance of environmental integrity. This means that any emission reductions counted as ITMOs must be real, measurable, permanent, additional, and verified through credible monitoring and reporting mechanisms. "Real" implies that the reductions actually occurred, "measurable" refers to the ability to quantify them accurately, and "permanent" means the reductions should not be reversed in the future (example through deforestation after a reforestation project). "Additional" means the mitigation outcome would not have occurred without the incentive provided by the ITMO mechanism, and "verified" ensures third-party validation. This criterion is intended to prevent greenwashing and maintain the integrity of global carbon markets by ensuring that transferred mitigation outcomes represent true climate benefits. **Findings:** Indonesia's regulation emphasizes that emission reduction activities must be measurable, reportable, verifiable (MRV) and meet additionality. Article 14 of Presidential Decree 98/2021 states that all mitigation actions must align with national climate goals and undergo verification<sup>22</sup>. Indonesia has established MRV standards, but full application across all sectors and for ITMOs is still developing. Third-party verification systems are also still maturing; therefore, Indonesia has partially met this requirement.

**2. Corresponding Adjustment (CA):** Corresponding adjustments are essential to avoid double counting of emission reductions in the national accounts of both the selling and purchasing countries. Under Article 6.2, when a country (host) sells an ITMO to another country (buyer), both must make adjustments in their Nationally Determined Contributions (NDCs). The host country subtracts the emission reduction from its national accounting (a minus entry), while the acquiring country adds it to theirs (a plus entry). For example, if Indonesia transfers 1 million tons of (tCO<sub>2</sub>e) equivalent as ITMOs to Japan, Indonesia must deduct that amount from its own emissions reduction target, while Japan can claim that amount toward its own NDC goals. This accounting

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<sup>21</sup> UNFCCC. (2018). *The Katowice climate package. Entire document; cited for Article 6 Rulebook development (COP24)*.

<sup>22</sup> Government of Indonesia. (2021). *Presidential Regulation No. 98/2021 on the Implementation of Carbon Economic Value. Articles 10, 14, 36, 56–59: Key sections used for MRV, CA, sustainability, and SRN*.

mechanism ensures the integrity of international carbon trading and maintains a balanced global emissions ledger. **Findings:** Article 58 and 59 explicitly mention that corresponding adjustments will be applied to ensure transparency in international carbon trades. However, Indonesia is still in the process of finalizing its technical guidelines for CA application. While the legal basis exists, operational procedures and consistent application of corresponding adjustments (especially across multiple projects or sectors) are still being piloted. Therefore, Indonesia has not fully met this requirement.

**3. Robust Accounting:** Robust accounting is necessary to ensure that ITMOs are accurately recorded, tracked, and reported throughout their lifecycle. This involves using structured accounting frameworks that are consistent with IPCC guidelines and international standards. Countries must maintain national registries or connect with international registries to track the issuance, transfer, and cancellation of ITMOs. Robust accounting systems are essential for creating trust and transparency in the carbon market and are subject to periodic review and verification. Indonesia, for instance, has established its own national accounting system to support robust accounting and align domestic carbon activities with international ITMO standards. **Findings:** Indonesia has created the SRN PPI (*Sistem Registri Nasional Pengendalian Perubahan Iklim*), mandated in Article 56–57, to track mitigation actions and emission reductions. This registry supports project registration, verification, and ITMO tracking. The system is operational, but integration with international registries and compatibility with UNFCCC Biennial Transparency Report (BTR) requirements are still evolving. SRN is not yet open for full real-time international transfers. Therefore, Indonesia has partially met this requirement.

**4. Transparency:** Transparency is a core requirement under Article 6.2, aimed at building international confidence and facilitating oversight. Countries engaging in ITMO transactions must report these activities in their Biennial Transparency Reports (BTRs), submitted to the UNFCCC. These reports must include structured summaries of ITMO transfers and describe how the country ensures environmental integrity, applies corresponding adjustments, and promotes sustainable development. Additionally, these reports are subject to technical expert review to validate their content and compliance with Article 6.2 guidelines. Transparency helps maintain accountability among countries and prevents discrepancies in emissions reporting. **Findings:** Presidential Decree 98/2021 requires transparency in climate-related actions and mandates regular reporting to the government. However, Indonesia has yet to submit a Biennial Transparency Report (BTR) under the enhanced transparency framework of the Paris Agreement. Transparency mechanisms exist domestically, but Indonesia must align them with UNFCCC international reporting standards,

including ITMO-related structured summaries. Therefore, Indonesia has not fully met this requirement.

**5. Avoidance of Double Use and Double Claiming:** A fundamental requirement in the ITMO framework is the avoidance of double use or double claiming. Each ITMO must be used only once to meet a climate target, ensuring that no two countries claim credit for the same emission reduction. To enforce this, countries are required to maintain transparent and interconnected tracking systems or registries to monitor ITMO generation, transfer, and use. If two countries were to claim the same unit, it would undermine the environmental effectiveness of global mitigation efforts. Consequently, the use of corresponding adjustments and robust registries is critical to preventing such overlaps and ensuring that each ITMO serves a unique and verifiable climate contribution. **Findings:** Indonesia's registry system (SRN PPI) is intended to avoid double counting. The regulation states that one emission reduction unit cannot be claimed in two places, especially for ITMOs. The commitment is clear, and systems are in place to prevent overlap, but the absence of finalized CA implementation still leaves a gap in fully avoiding double use. Therefore, Indonesia has partially met this requirement.

**6. Sustainable Development:** Lastly, ITMOs must contribute to sustainable development in the host country. While environmental benefits are central, Article 6.2 also emphasizes social and economic gains. Countries must demonstrate how each ITMO project aligns with their national development priorities, such as poverty reduction, renewable energy access, biodiversity protection, or employment creation. This criterion ensures that ITMO projects do not only reduce emissions but also generate broader co-benefits that support the host country's long-term growth and resilience. Indonesia, for instance, integrates sustainable development goals (SDGs) into its carbon policy framework to ensure ITMO projects align with its national agenda. **Findings:** Indonesia mandates that carbon activities, including ITMOs, must align with national development goals. Article 10 and 36 ensure that projects contribute to economic, social, and environmental outcomes. Sustainable development co-benefits are clearly integrated into Indonesia's carbon crediting framework, thereby indicating that Indonesia has fully met this requirement.

**C.2. Indonesia's overall green-house gas (CO<sub>2</sub>) emission levels per metric-tons of carbon dioxide equivalent (tCO<sub>2</sub>e). The process of analysing the data were as followed:**

1. **Established the Target** - Indonesia's 2030 GHG emissions reduction targets were identified as outlined in its Nationally Determined Contributions (NDCs), including the unconditional (31.89%) and conditional (43.2%) reductions from the projected Business-As-Usual (BAU) scenario.

2. **Clarified the Baseline (BAU)** - The 2030 BAU projection is 2.87 (MtCO<sub>2e</sub>) and the unconditional and conditional targets are as mentioned above, we can use the formular below to identify the benchmark or emissions cap ;

$$\text{Emissions Cap} = \text{BAU Emission} \times (1 - \text{Reduction Target (\%)})$$

$$\text{So; Emission Cap} = 2.87 \text{ MtCO}_2\text{e} \times (1 - 31.89\%)$$

$$\text{Emission Cap} = 2.87 \text{ MtCO}_2\text{e} \times 0.6811$$

$$\text{Therefore; Emission Cap} = 1.954757 \text{ MtCO}_2\text{e} \text{ (Unconditional)}$$

$$\text{Emissions Cap} = \text{BAU Emission} \times (1 - \text{Reduction Target (\%)})$$

$$\text{So; Emission Cap} = 2.87 \text{ MtCO}_2\text{e} \times (1 - 43.2\%)$$

$$\text{Emission Cap} = 2.87 \text{ MtCO}_2\text{e} \times 0.568$$

$$\text{Therefore; Emission Cap} = 1.63016 \text{ MtCO}_2\text{e} \text{ (Conditional)}$$

Based on Indonesia's official 2030 BAU projection of **2.869 MtCO<sub>2e</sub>**, the country has set two emissions reduction targets. Under the unconditional target, which relies solely on domestic efforts, emissions must be reduced by 31.89%, bringing the allowable level down to approximately **1.954 MtCO<sub>2e</sub>** by 2030. Under the conditional target, which depends on international support such as climate finance and technology transfer, the reduction goal increases to 43.2%, lowering the emissions cap to around **1.630 MtCO<sub>2e</sub>**. These caps serve as benchmarks for evaluating whether Indonesia is on track to meet its climate commitments, however the focus is solely on the **unconditional target**.

3. **Collected Past 5 Years of Emissions Data** - Emissions data from the past five years (2019–2023) was gathered using national reports and the EDGAR Report 2024<sup>23</sup>. The data reflected total national emissions across all sectors, including energy, industry, agriculture, and key mitigation sectors such as FOLU (Forestry and Other Land Use) and LULUCF (Land Use, Land-Use Change, and Forestry).

Table : Indonesia total emissions period (2019-2023). Source: EDGAR 2024

Indonesia's Overall Emissions per year (MtCO <sub>2e</sub> /year)
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<sup>23</sup> EDGAR – European Commission. (2024). *GHG emissions of all world countries report. Emissions Database for Global Atmospheric Research. Country data spreadsheet and annex tables, especially for Indonesia (pp. 27–29, Appendix A).*

2019	1108.7777 MtCO <sub>2</sub> e
2020	1050.33915 MtCO <sub>2</sub> e
2021	1077.07784 MtCO <sub>2</sub> e
2022	1152.72601 MtCO <sub>2</sub> e
2023	1200.19979 MtCO <sub>2</sub> e

4. Analysed the Emissions Trend – Using a descriptive statistic method, the mean, minimum and maximum emission levels were identified to observe whether emissions were increasing, decreasing, or stabilizing, and was compared to the required emissions reduction cap of 1.954757 MtCO<sub>2</sub>e **unconditionally** to meet the 2030 target.

#### Descriptive Statistical Analysis

	Valid	Missing	Mean	Std. Deviation	Minimum	Maximum
Year	5	0	2021.000	1.581	2019.000	2023.000
(MtCO <sub>2</sub> e)	5	0	1117.824	59.792	1050.339	1200.200

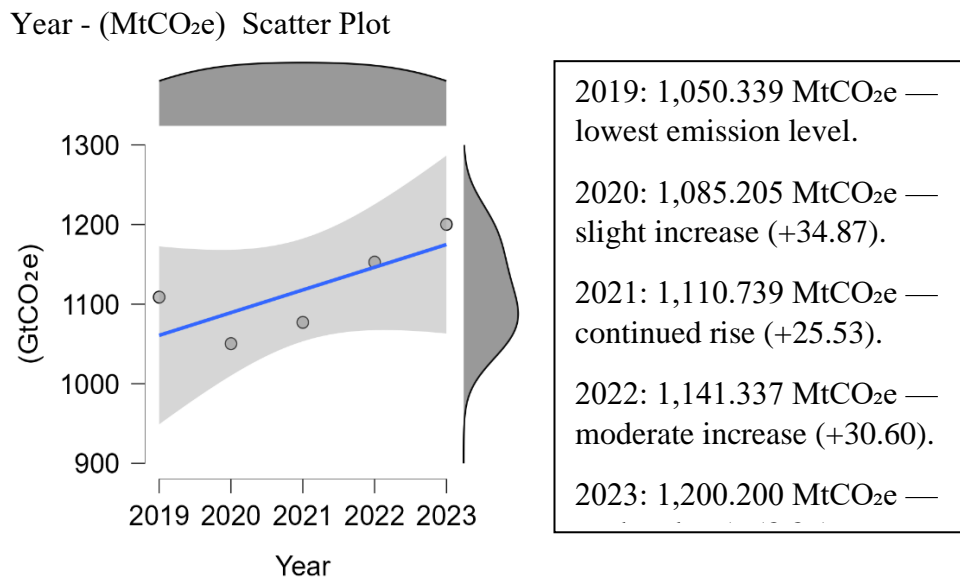
Figure: Descriptive statistics on Indonesia’s emission levels. Source: Author using JASP.

Mean emissions; 1.118 MtCO<sub>2</sub>e | Maximum emissions; 1.200 MtCO<sub>2</sub>e | Minimum emissions; 1.050 MtCO<sub>2</sub>e

Indonesia’s GHG emissions from 2019 to 2023 averaged 1,117.824 MtCO<sub>2</sub>e, with a standard deviation of 59.792 MtCO<sub>2</sub>e, indicating moderate year-to-year variation. Emissions ranged from 1,050.339 MtCO<sub>2</sub>e in 2019 to 1,200.200 MtCO<sub>2</sub>e in 2023, showing a steady upward trend. The average year was 2021.0, with a standard deviation of 1.581, reflecting evenly spaced data. Despite the rise, emissions remain below the 2030 unconditional cap of 1,954.757 MtCO<sub>2</sub>e, though continued growth may risk future compliance if unchecked<sup>24</sup>.

<sup>24</sup> Climate Action Tracker. (2023). *Indonesia country assessment report. Climate Analytics & New Climate Institute, pp. 1–4 and pp. 10–11: Emissions projections, policy trajectory toward 2030 NDCs.*

5. Year-based Trajectory Assessment - The data was plotted on a scatter plot to observe the emission trends on a year-to-year basis.



Graph: Scatter plot showing a steady increase in Indonesia's GHG emissions from 2019 to 2023. Source: Analysed by the author using JASP.

The scatter plot visually illustrates the trend of Indonesia's greenhouse gas (GHG) emissions from 2019 to 2023, measured in MtCO<sub>2e</sub>. Each data point represents the total national emissions for a given year, plotted along the Y-axis, while the X-axis denotes the corresponding year. The plotted points form an upward-sloping linear pattern, **indicating a positive correlation between time and emissions**. Specifically, emissions increased from approximately 1,050 MtCO<sub>2e</sub> in 2019 to 1,200 MtCO<sub>2e</sub> in 2023. This trend is further reinforced by the inclusion of a linear trend line, which highlights a consistent year-on-year increase. The visual presentation confirms the numerical findings from the descriptive statistics, demonstrating a steady and measurable rise in Indonesia's GHG emissions over the observed period.

#### D. CONCLUSION

This study examined Indonesia's preparedness and strategic positioning in implementing carbon credit mechanisms under Article 6.2 of the Paris Agreement, with emphasis on regulatory alignment, institutional capacity, and long-term climate market engagement. From 2019 to 2023, national GHG emissions averaged around 1,117 MtCO<sub>2e</sub>, remaining below the unconditional cap of 1,954.757 MtCO<sub>2e</sub>; however, a steadily increasing trend is a threat. For future research, expanding the timeframe beyond 2023 and incorporating sector-specific data would enable more

granular trend analysis. Further exploration into the effectiveness of MRV systems, legal enforcement, subnational institutional readiness, and the role of private sector and international cooperation would enhance understanding of Indonesia's capacity to scale ITMO participation and meet long-term climate commitments.

## E. REFERENCES

- Ahonen, H., et al. (2021). *Crediting mechanisms under Article 6.2: Ensuring integrity and transparency. Partnership for Market Readiness*, pp. 7–12: *Used for criteria like additionality, monitoring, and double counting.*
- Climate Change Expert Group (CCEG). (2022). *Operationalizing Article 6 of the Paris Agreement: Options for reporting ITMOs. OECD & IEA*, pp. 5–10: *Authorisation and accounting procedures; tables referenced in ITMO policy analysis.*
- Climate Action Tracker. (2023). *Indonesia country assessment report. Climate Analytics & New Climate Institute*, pp. 1–4 and pp. 10–11: *Emissions projections, policy trajectory toward 2030 NDCs.*
- Dima, H. M., & Adjani, W. K. (2024). *Building a robust international carbon crediting framework: Insights from Indonesia's Joint Crediting Mechanism. IOP Conference Series: Earth and Environmental Science*, 1395(1), 012030. <https://doi.org/10.1088/1755-1315/1395/1/012030>, pp. 2–4: *Framework description of SPE-GRK, SRN-PPI and registry structure.*
- EDGAR – European Commission. (2024). *GHG emissions of all world countries report. Emissions Database for Global Atmospheric Research. Country data spreadsheet and annex tables, especially for Indonesia (pp. 27–29, Appendix A).*
- Espejo, C., et al. (2020). *Challenges in measuring emission reductions in carbon markets. Climate Policy*, 20(7), 812–826. <https://doi.org/10.1080/14693062.2020.1773758>, pp. 813–820: *Limitations of verification and non-permanence in carbon credit schemes.*
- Government of Indonesia. (2021). *Presidential Regulation No. 98/2021 on the Implementation of Carbon Economic Value. Articles 10, 14, 36, 56–59: Key sections used for MRV, CA, sustainability, and SRN.*
- Government of Indonesia. (2022). *Enhanced Nationally Determined Contribution (ENDC). Ministry of Environment and Forestry*, pp. 4–10: *National targets, NDC breakdowns, Article 6.2 role in GHG mitigation.*
- Government of Indonesia. (2023). *Law No. 4/2023 on Development and Strengthening of the Financial Sector. Relevant for enabling IDXCarbon legality.*
- Government of Indonesia. (2023). *Government Regulation No. 12/04/2023. Cited as statutory basis for investment frameworks.*

- Government of Indonesia. (2021). *Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050)*, pp. 12–20: *National net-zero targets and roadmap to 2060*.
- Hukumonline. (2021). *10 Artikel Hukum Terpopuler Sepanjang 2021. Referenced in context of legal and regulatory awareness*.
- International Emissions Trading Association (IETA). (2023). *The rise of the voluntary carbon market*, pp. 6–9: *VCM structure, private sector involvement*.
- Indonesian Business Council. (2024). *Preparing a globally competitive carbon market in Indonesia*, pp. 5–7: *Voluntary carbon market certification (ICVCM, VCS, ACR, GS), market infrastructure*.
- Mintz. (2022). *Carbon Credit and Carbon Offset Fundamentals*, pp. 2–5: *Carbon credit basics, compliance vs voluntary markets*.
- Michaelowa, A., et al. (2019). *Crediting standards and environmental integrity: The role of the voluntary carbon market*. *Climate Policy*, 19(9), 1091–1104. <https://doi.org/10.1080/14693062.2019.1614656>, pp. 1092–1100: *Role of Verra, Gold Standard, and environmental safeguards*.
- Otoritas Jasa Keuangan (OJK). (2023). *Regulation No. 14/2023 on Carbon Trading via Carbon Exchange. Regulation cited for trading mechanisms (Auction, Negotiated, Marketplace)*.
- Partnership for Market Readiness. (2021). *Crediting mechanisms for Article 6 of the Paris Agreement*. *World Bank Group*, pp. 15–22: *Crediting cycle, baseline methodology, mitigation outcomes*.
- PwC Indonesia. (2024). *Transparency report 2024*, pp. 12–14: *Transparency indicators and NEK implementation*.
- UNFCCC. (2018). *The Katowice climate package. Entire document; cited for Article 6 Rulebook development (COP24)*.
- UNFCCC. (2021). *The Glasgow Climate Pact – Key outcomes from COP26*, pp. 6–9: *Finalisation of Article 6 guidelines (especially 6.2 and 6.4 mechanisms)*.
- UNFCCC. (2022). *UN Climate Change Annual Report 2020*, pp. 11–17: *Overview of progress, transparency framework, and Article 6 engagement*.
- UNFCCC. (2024). *Article 6.2 Reference Manual (Version 2)*, pp. 9–14: *ITMO authorisation, corresponding adjustment and reporting*.
- Van Oosterzee, P., et al. (2012). *Uncertainty and permanence in forestry carbon credits*. *Ecological Management & Restoration*, 13(1), 68–73, pp. 69–72: *Permanence risks and leakage in forestry-based carbon projects*.