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The Green Trade War: Legal Implications of the Carbon Border Adjustment Mechanism on Indonesia's International Trade

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Abstrak: Penelitian ini dilatarbelakangi oleh meningkatnya perhatian global terhadap kebijakan *Carbon Border Adjustment Mechanism* yang diterapkan oleh Uni Eropa sebagai upaya untuk mengatasi kebocoran karbon serta menjaga daya saing industri dalam negeri. Sebagian besar kajian sebelumnya masih berfokus pada aspek ekonomi dan perdagangan, sedangkan pembahasan mengenai dampak kebijakan tersebut terhadap negara berkembang seperti Indonesia masih terbatas. Penelitian ini bertujuan untuk menganalisis bagaimana penerapan kebijakan ini memengaruhi dinamika perdagangan dan daya saing ekspor Indonesia, serta memberikan gagasan bagi pengembangan regulasi karbon nasional yang sejalan dengan mekanisme global. Metode penelitian yang digunakan adalah pendekatan yuridis-normatif dengan analisis kualitatif melalui studi kepustakaan terhadap peraturan perundang-undangan, kebijakan internasional, dan doktrin hukum yang relevan. Hasil penelitian menunjukkan bahwa kebijakan ini berpotensi menambah beban biaya ekspor dan menurunkan daya saing produk Indonesia di pasar Uni Eropa, namun juga membuka peluang untuk memperkuat sistem nilai ekonomi karbon nasional melalui harmonisasi regulasi, peningkatan transparansi pelaporan emisi, serta penerapan teknologi rendah karbon yang berkelanjutan.

Kata Kunci: CBAM; Pajak Karbon; Hukum Perdagangan Internasional; Harmonisasi hukum; Negara Berkembang

Abstract: *This research is motivated by the growing global attention toward the Carbon Border Adjustment Mechanism implemented by the European Union as an effort to address carbon leakage and maintain the competitiveness of domestic industries. Most previous studies have primarily focused on the economic and trade dimensions, while discussions on the policy's impact on developing countries such as Indonesia remain limited. This study aims to analyze how the implementation of this policy affects Indonesia's trade dynamics and export competitiveness, as well as to provide insights for the development of national carbon regulation aligned with global mechanisms. The research employs a juridical-normative approach with qualitative analysis through a literature study of relevant legislation, international policies, and legal doctrines. The findings indicate that this policy potentially increases export costs and reduces the competitiveness of Indonesian products in the European market. However, it also presents an opportunity to strengthen Indonesia's national carbon economic value system through regulatory harmonization, enhanced transparency in emission reporting, and the adoption of sustainable low-carbon technologies.*

Keywords: *CBAM; Carbon Pricing; International Trade Law; Legal Harmonization; Developing Countries*

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INTRODUCTION

In recent decades, climate change has emerged as an urgent global issue with extensive implications for economic policies and international trade. Beyond impacting domestic policies, efforts to reduce carbon emissions have also influenced the dynamics of inter-state relations, particularly through trade regulations that integrate environmental values. A salient example of this phenomenon is the Carbon Border Adjustment Mechanism (CBAM) initiated by the European Union (EU). Through CBAM, the EU imposes additional costs on imported products with high carbon emission intensities, aiming to prevent carbon leakage while simultaneously creating a level playing field for domestic producers already subject to stringent carbon emission regulations.

This phenomenon is often referred to as the Green Trade War, a trade conflict not solely based on economic issues but incorporating environmental dimensions as a form of covert protectionism. Within this context, developing countries such as Indonesia face significant challenges as CBAM potentially augments the reality of trade costs and introduces legal and administrative complexities in international trade transactions.

According to recent data from The Observatory of Economic Complexity (2023), Indonesia is recorded as a major exporter of various carbon-intensive products, including coal briquettes, palm oil, ferroalloys, lignite, and natural gas, with primary export markets encompassing China, the United States, India, Japan, and Singapore. A significant portion of these carbon-intensive products falls within the scope of CBAM adjustments, potentially affecting Indonesia's export value to the European Union, estimated at approximately US$19 billion, covering sectors such as steel, cement, aluminum, and fertilizers. Given Indonesia's open economy and active involvement in international trade, the country needs to prepare responses to these regulatory challenges to maintain the smooth flow and effectiveness of trade transactions, particularly in ensuring legal certainty of contracts and preserving the competitiveness of export products. In this context, the research is conducted with the primary objective of analyzing how the implementation of CBAM by the European Union impacts international trade of Indonesian export products, and how Indonesia can develop an effective carbon tax regulatory framework as a policy adaptation model to this international mechanism.

The theoretical approach of this research is built upon the foundation of international trade law concepts, balancing principles of free trade and protection of contractual rights, with environmental policy theory and climate change mitigation that emphasize the importance of fair and effective regulations to reduce carbon emissions globally. The study also reviews empirical literature on the impact of cross-border carbon policies and carbon market mechanisms as innovative solutions in the context of transitioning towards a low-carbon economy.

METHOD

The research employs a normative methodology with a comparative approach. The normative approach is utilized to analyze legal materials (doctrines, principles, and regulations) pertaining to CBAM and Indonesian carbon regulations, while empirical elements complement the study with relevant factual data. The concept of normative legal research refers to the literature asserting that normative legal research typically constitutes a document study utilizing legal source materials such as legislation, court decisions, contracts/agreements, legal theories, and scholarly opinions (Bambang Waluyi, 1996). Normative legal research is conducted by examining library materials (secondary data) and differs from sociological/empirical legal research that investigates primary data (Soekanto & Mamudji, 1995). The mandate of the normative approach employed includes: determining the legal relationship and status of parties, providing legal assessment (justification) of legal events, and rectifying and maintaining the consistency of the normative system with legal principles and

doctrines (Mukti Fajar & Yulianto Achmad). The types of data used consist of primary data in the form of Indonesian carbon-related legislation, EU CBAM regulations, official policy documents, and international trade contracts/rules. Secondary data include official reports on relevant data, journal articles, and working papers. The data analysis employs a qualitative method. Content analysis serves as the primary technique for interpreting regulatory texts, judicial decisions, and scholarly literature, as well as for identifying legal norms, gaps, and contractual implications. This is followed by a comparative analysis to juxtapose CBAM provisions with Indonesia's legal framework and practices. The normative analysis concentrates on norm interpretation, assessment of legal consistency, and evaluation of compliance with international legal principles. Empirical elements are presented descriptively to illustrate factual conditions that inform policy recommendations.

RESULT AND DISCUSSION

Results

As illustrated in Figure 1, the initial phase of literature search yielded a total of 2,643 documents identified through Google Scholar utilizing the Publish or Perish software. The search was conducted using three keyword combinations related to Carbon Border Adjustment Mechanism (CBAM), carbon pricing, international trade law, legal harmonization, and developing countries. Specifically, the search using the keyword "CBAM" produced 805 documents, while the keyword combination "Carbon Pricing, International Trade Law" yielded 926 documents. The final search employing the keywords "Carbon Pricing, Legal Harmonization, Developing Countries" resulted in 912 documents. In aggregate, a total of 2,643 initial articles were collected for subsequent selection stages. Following the removal of 120 duplicate entries, 2,523 documents proceeded to the initial screening phase. At this stage, all titles and abstracts were scrutinized to exclude 1,732 publications that did not align with the research scope, leaving 790 articles. These were further filtered, resulting in 156 articles for full-text evaluation. Subsequently, during the full-text evaluation phase, 126 articles were excluded due to insufficient discussion of international trade law and policy aspects and/or not being in journal format and not written in English.

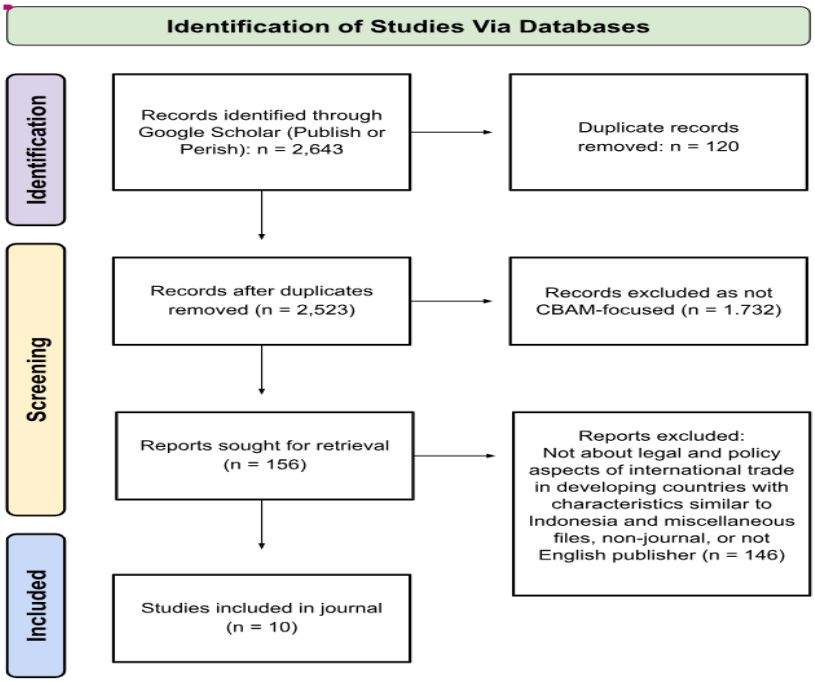

Figure 1. Research protocol - PRISMA flow diagram.

Consequently, a total of 10 full-text articles successfully passed through to the final quality assessment stage and were subjected to further analysis. These articles were deemed relevant to the research focus on the Carbon Border Adjustment Mechanism (CBAM), carbon pricing mechanisms, and their implications for international trade law, particularly within the context of developing countries.

Discussion

1. Implementation Of Carbon Border Adjustment Mechanism

As explained in the introduction, the Carbon Border Adjustment Mechanism (CBAM) is an EU environmental and trade policy instrument that came into effect on October 1, 2023, in a transitional phase and will enter full implementation on January 1, 2026. The main goal of CBAM is to internalize carbon costs on imported products, thus preventing carbon leakage, which is the phenomenon of production shifting to countries with looser environmental standards. At the same time, it aims to maintain competitive equality between domestic EU products already subject to the EU ETS emissions trading system and imported products.[1]

CBAM specifically targets products from heavy industry and the energy sector, which are known to have high carbon intensity. The main products included in the scope are iron and steel, cement, fertilizers, aluminum, and electricity.[2] The iron and steel sector accounts for the largest share of carbon emissions in global manufacturing industries, with iron reduction processes using fossil fuels and being energy-intensive. Cement is an emission-intensive product due to the calcination process of limestone, which directly and significantly produces CO2 emissions. Fertilizer production uses natural gas as the primary fuel, which also contributes significantly to carbon emissions, while aluminum receives special attention due to its electrolysis process, which is highly dependent on electricity. If this electricity comes from fossil fuels, it can substantially increase carbon emissions. Electrical products are subject to monitoring when imported into the European Union from countries with fossil fuel-based power generation, thus expanding the scope of CBAM to the energy sector. The selection of these products is based on an evaluation of the combination between high carbon intensity and carbon leakage potential, so that the CBAM mechanism can play an effective role in driving energy and production transformation at the global level.[3]

Under the CBAM mechanism, importers bringing high-carbon products into the European Union have a significant obligation. During the transition period (October 2023–December 2025), importers are required to report the amount of carbon emissions contained in imported products to EU authorities, but are not yet required to pay carbon costs through the purchase of CBAM certificates. The reporting obligation is done annually and must be submitted no later than January 31st of the following year.

Entering the definitive phase starting January 1, 2026, importers will be required to purchase CBAM certificates equivalent to the amount of carbon emissions from products

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[1] OECD. (2025, March 5). *EU carbon border adjustment mechanism: What is it, how does it work, and what are the effects?* OECD Blogs. https://www.oecd.org/en/blogs/2025/03/eu-carbon-border-adjustment-mechanism-what-is-it-how-does-it-work-and-what-are-the-effects.html

[2] PwC Indonesia. (2024, March 6). *PwC Indonesia and IDCTA hosted a seminar on the EU Carbon Border Adjustment Mechanism.* PwC. https://www.pwc.com/id/en/media-centre/press-release/2024/english/pwc-indonesia-and-idcta-hosted-a-seminar-on-the-eu-carbon-border.html

[3] Fauri, A., Friawan, D., Xu, N., Febiandita, S., & Aswicahyono, H. (2025). *The EU CBAM and its implications for Indonesia* (p. 12–14). Centre for Strategic and International Studies (CSIS). https://s3-csis-web.s3.ap southeast1.amazonaws.com/doc/CSIS_2025_Working_Paper_CBAM_DFD.pdf?download=1

entering the European Union market. Importers must register as "authorized CBAM declarants" who will be fully responsible for data reporting and certificate purchases in accordance with the regulations. This certification system is designed to align with the EU ETS carbon market to avoid double charging, which could trigger economic distortions. Additionally, EU authorities conduct strict compliance audits to ensure reporting transparency and avoid fraud.

The calculation of carbon emissions under CBAM is done using a method that refers to real production data from companies producing those products outside the European Union. This calculation method calculates emissions related to the production process, including fuel consumption, electricity, and raw materials throughout the product supply chain. If actual data is unavailable or cannot be verified, a default mechanism is used based on average emissions within the relevant sector, to ensure fairness and prevent data manipulation.

The price adjustment for CBAM certificates purchased by importers is based on the real-time carbon market price prevailing in the EU ETS, meaning importers must be prepared for fluctuations in carbon prices that can affect the cost structure of their imported products. This provides an incentive for non-EU producers to improve their carbon efficiency so that certificate costs are reduced and products are more competitive in the EU market.

2. Carbon Border Adjustment Mechanism in International Trade

In the realm of international trade, CBAM is a mechanism implemented by the European Union to address the risk of carbon leakage and ensure fair competition by imposing a carbon cost on imported products with high greenhouse gas emission intensity. Importers in the European Union are required to purchase carbon certificates, the value of which is based on the calculation of the product's carbon emissions, reflected in the carbon price on the EU ETS market. This reporting and payment process will be fully mandatory from 2026. The carbon price used as the basis for cost adjustment under the CBAM is described by Enerdata as stable EU ETS carbon market prices, which serve as the main benchmark for this mechanism. This price internalizes environmental impacts and affects the overall cost of trading carbon-intensive products, encouraging market participants to improve emission efficiency and invest in low-carbon technologies.[4]

Additionally, a study by the Center for Strategic and International Studies (CSIS) details the importance of emission calculation and reporting mechanisms in the CBAM, based on product life cycle analysis and strict reporting standards. CSIS also emphasizes the role of digital technology, automation platforms, and artificial intelligence in ensuring data accuracy and regulatory compliance with the CBAM. The issue of capacity and technology transfer to developing countries was also highlighted, so it doesn't become a discriminatory economic burden, including national policy adjustments in exporting countries like Indonesia to remain competitive in the global market. CBAM was also reviewed as a policy instrument that not only impacts trade but also motivates the global transition toward low-carbon industries and the harmonization of carbon pricing mechanisms between countries.[5]

In the context of international trade relations, many countries have reacted to the EU's CBAM policy with concerns about potential disputes at the WTO. Some developing

[4] Mantulet, G., Peffen, A., & Cail, S. (2023, November). *Carbon price forecast under EU ETS: Executive briefing* (p. 5–6). Enerdata. https://www.enerdata.net/publications/executive-briefing/carbon-price-forecast-under-eu-ets.pdf

[5] Fauri, A., Friawan, D., Xu, N., Febiandita, S., & Aswicahyono, H. (2025). *The EU CBAM and its implications for Indonesia . Centre for Strategic and International Studies (CSIS)*. https://s3-csis-web.s3.ap-southeast-1.amazonaws.com/doc/CSIS_2025_Working_Paper_CBAM_DFD.pdf?download=1

countries, including Indonesia and India, view CBAM as a trade barrier disguised as an environmental issue that could lead to hidden protectionism and discrimination against their export products. For example, Indonesia is involved in trade disputes with the EU regarding various policies that ultimately burden exporters, including CBAM, which impacts exports of products such as coffee, chocolate, wood, rubber, and palm oil. The Indonesian government is preparing a strategy to use the WTO forum to express its objections and defend national trade interests.

According to legal analysis, CBAM is being tested for its compatibility with WTO rules, particularly regarding the Agreement on Technical Barriers to Trade (TBT). The TBT Agreement itself is one of the important agreements under the WTO, aiming to ensure that technical regulations, standards, and conformity assessment procedures do not become unnecessary trade barriers. The TBT promotes the alignment of international standards and requires that technical regulations are non-discriminatory and proportionate to the objectives to be achieved, such as health, safety, or environmental protection.[6] This agreement ensures that standards, technical regulations, and conformity assessment procedures implemented by a country's government are not used as hidden barriers to international trade, emphasizing the principles of non-discrimination and the harmonization of international standards to minimize unnecessary trade barriers. CBAM aims to align environmental policy with free trade, but it still presents challenges in terms of WTO compliance and the need for international cooperation to prevent this policy from becoming an illegitimate trade barrier.

Linking this to CBAM, the mechanism's compatibility with the principles set out in the TBT was tested, particularly regarding non-discrimination and reasonable trade restrictions. CBAM aims to align environmental policies with free trade, but it still poses challenges in terms of compliance with WTO rules. This is because of the potential for CBAM to become an illegal trade barrier if it is discriminatory or exceeds environmental protection goals. The WTO Director-General even stated the need for a global carbon pricing system to minimize trade friction caused by unilateral policies such as CBAM. The WTO, along with other international organizations, is working to establish a global carbon price to avoid disputes and discrimination. However, some developing countries still consider CBAM potentially harmful because of their small contribution to global emissions while having to face high costs and market access barriers.[7]

In terms of WTO legal aspects, CBAM has the potential to violate the Most Favored Nation (MFN) and National Treatment principles, as it benefits countries and importers integrated into carbon pricing systems like the EU ETS, while developing countries do not. This regulation restricts market access for countries that do not meet strict emission reporting requirements, thus violating WTO's non-discrimination principle.[8] Furthermore, CBAM exacerbates the gap in access to green technology because such technology is still concentrated in developed countries, making it difficult for developing countries to access and utilize it for a low-carbon transition.[9]

CBAM within the framework of global trade law could become a trade barrier and pose dispute risks at the WTO, particularly concerning discrimination against importers

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[6] Siregar, A. (2023). *Penyelesaian sengketa dagang mengenai mekanisme Technical Barriers to Trade dalam perdagangan World Trade* (pp. 335) *Organization. Morality: Jurnal Ilmu Hukum*. https://jurnal.upgriplk.ac.id/index.php/morality/article/view/649/268

[7] Agro Indonesia. (2023, December 4). *WTO: Demi hindari gesekan perdagangan, perlu ada harga karbon global.* https://agroindonesia.co.id/wto-demi-hindari-gesekan-perdagangan-perlu-ada-harga-karbon-global/

[8] Kalinda, J. M. (2025). *CBAM and the WTO: How the EU's climate tool may hurt developing countries* (p.3-4). SSRN. https://doi.org/10.2139/ssrn.5264425

[9] Wirdyansyah, D. M. (2025). *Carbon border adjustment mechanism (CBAM) and its implications for developing economies: A systematic literature review* (p. 171). *Indonesian Journal of Energy.* https://www.ije-pyc.org/IJE/article/view/292/94

from countries without carbon pricing policies. Developing countries such as China, India, Brazil, and South Africa view CBAM as disguised protectionism that could disrupt free trade and plan to file a dispute at the WTO. Although the European Union believes CBAM complies with WTO rules, challenges related to emissions reporting and the elimination of free emissions allowances could lead to disputes. With the WTO Appellate Body non-functional, disputes can be referred to an interim arbitration system. Thus, CBAM raises complex issues in global trade law, requiring resolution through multilateral dialog and technical support to prevent it from becoming a detrimental trade barrier, especially for developing countries.[10]

3. The Impact of Carbon Border Adjustment Mechanism Implementation on Indonesia's Export Trade

The implementation of CBAM (Carbon Border Adjustment Mechanism) may not have a significant direct impact on Indonesia, but it is expected to have a significant effect on Indonesian export products, depending on the relevant sectors and main markets. Based on data from *Badan Pusat Statisik* (Central Bureau of Statistics), the Indonesian steel and iron sector is not among the main export markets to the European Union, as from 2012 to 2022, the European Union was not among the top 10 export destinations for Indonesian iron and steel. The main markets for the product are China, with an export volume of 11.6 million tons valued at US9.1 billion, India with 589 thousand tons valued at US.31 billion, and Taiwan with 1.31 million tons valued at US .19 billion. Therefore, the direct impact on Indonesia's export trade in this sector is relatively small.[11]

However, the Indonesian government and companies should not feel completely safe because, according to the official website of the European Union, the implementation of CBAM on products such as iron, steel, aluminum, fertilizers, cement, and hydrogen is currently still in the early stages of the transition phase lasting from 2023 to 2026. This opens up the possibility that other products or commodities will also be subject to CBAM in the future.[12] In the cement sector, in 2022 Indonesia's export volume reached 10.7 million tons, an increase of 20.22% compared to the previous year. Although this year's projections indicate a slight potential decrease, the volume is still above 10 million tons.[13] Fertilizer and aluminum products are also included in the CBAM scope and have export markets in the European Union, although their market share is relatively smaller compared to markets in Asia and the Americas. This is part of the initial implementation phase of CBAM, which is still in transition and could potentially expand to include other products in the future.

From a readiness perspective, Indonesia still faces challenges in meeting CBAM requirements because it does not yet have strict carbon policies and domestic carbon prices are still relatively low. For example, through Law No. 7/2021 on Harmonization of Taxation Regulations (UU *No.7 Tahun* 2021), the Indonesian government sets a carbon tax of

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[10] Seneca ESG. (2022, March 17). *Europe's CBAM and its impact on China.* https://senecaesg.com/id/insights/insight-europes-cbam-and-its-impact-on-china/

[11] Badan Pusat Statistik. (2024). *Exports of iron & steel by major countries of destination, 2012–2024.* https://www.bps.go.id/en/statistics-table/1/MjAzMyMx/exports-of-iron-steel-by-major-countries-of-destination--2012-2024.html

[12] Modern Diplomacy. (2024, June 17). *CBAM European Union: Impact and adaptation strategies for Indonesian exports.* https://moderndiplomacy.eu/2024/06/17/cbam-european-union-impact-and-adaptation-strategies-for-indonesian-exports/

[13] Indonesia Business Post. (2023, October 4). *Cement association expresses concerns on EU's carbon border adjustment mechanism.* https://indonesiabusinesspost.com/2093/Politics/cement-association-expresses-concerns-on-eus-carbon-border-adjustment-mechanism

Rp.30,000 per ton of CO2.[14] This situation makes it difficult for Indonesia to obtain an exemption from CBAM, unlike countries that already have carbon mitigation systems equivalent to the European Union. Additionally, the still-dominant conventional production methods, especially in the iron and cement sectors which heavily rely on coal-based processes with high emissions, need to be significantly improved to meet the EU's required environmental standards.[15]

In the future, in addition to these products, palm oil also has the potential to become an Indonesian export product affected by CBAM. This is due to the issues of deforestation and the high carbon emissions resulting from land clearing and forest burning in Indonesia. The main export markets for palm oil in the European Union include countries such as Spain, Italy, and the Netherlands. Against this backdrop, the implementation of CBAM has the potential to significantly impact Indonesian export products, especially if there is no improvement in carbon mitigation and stricter environmental management.

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CBAM requires EU importers to purchase CBAM certificates based on the level of carbon emissions generated by imported products. This means Indonesian producers will have to bear the additional cost reflecting the carbon price in the EU, which is currently estimated to be around €91-100 per ton of CO2 in 2026. As a result, the export selling prices of Indonesian products to the European Union have increased, especially for carbon-intensive products such as cement, steel, aluminum, and fertilizers.

This mechanism sets a maximum limit on carbon emissions (cap) and companies are required to have permits (allowances) for every ton of CO2 they emit. The price of these permits is determined by the market and serves as an economic signal to reduce emissions by increasing the cost for those who exceed the emission limit. According to Reuters in July 2025, which involved ten analysts, the average price of European Union carbon permits (EU Allowances/EUA) for 2026 is estimated to be around €91.08 per ton of CO2, a slight decrease compared to the previous forecast in April 2025, which was €92.48 per ton. For 2025, the average price projection is approximately €75.15 per ton, with a conservative range between €70-75 per ton. This reflects the impact of reduced supply of auctioned permits, the decline in free allocations starting in 2026, and the European Union's strict policies in achieving increasingly ambitious decarbonization targets.[16]

With the increase in selling prices due to carbon costs, Indonesian products become less competitive in the European Union market compared to products from countries that already have equivalent or better carbon reduction policies. This impact forces Indonesian

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[14] Fauri, A., Friawan, D., Xu, N., Febiandita, S., & Aswicahyono, H. (2025). *The EU CBAM and its implications for Indonesia* (p. 8). *Centre for Strategic and International Studies (CSIS).* https://s3-csis-web.s3.ap-southeast1.amazonaws.com/doc/CSIS_2025_Working_Paper_CBAM_DFD.pdf?download=1

[15] Modern Diplomacy. (2024, June 17). *CBAM European Union: Impact and adaptation strategies for Indonesian exports.* https://moderndiplomacy.eu/2024/06/17/cbam-european-union-impact-and-adaptation-strategies-for-indonesian-exports/

[16] Reuters. (2025, July 16). *Analysts: EU carbon price forecasts steady, US tariff concerns linger.* https://www.reuters.com/sustainability/climate-energy/analysts-eu-carbon-price-forecasts-steady-us-tariff-concerns-linger-2025-07-16/

exporters to consider reducing profit margins or even lowering prices to remain accepted in the EU market, which could erode industry profitability. The increase in export costs is expected to reduce demand for Indonesian products in the EU market due to higher prices. The cement and steel sectors are likely to experience a decline in export volume because the EU is not a major market and is more price-sensitive. However, on the other hand, companies that adapt to low-carbon technologies or achieve carbon cost reductions can maintain or expand their market share.

4. The Comparison of EU's CBAM Mechanism and Indonesia's Carbon Regulations

The European Union's Carbon Border Adjustment Mechanism (CBAM) and Indonesia's national carbon policy through Presidential Regulation No. 98 of 2021 on the Implementation of Carbon Economic Value (Nilai Ekonomi Karbon)/("NEK") represent two distinct approaches to carbon emission governance. Both aim to internalize the external costs of greenhouse gas (GHG) emissions into economic activities, yet they exhibit fundamental differences in their orientation, scope, and policy logic.

CBAM functions as a border-based carbon pricing mechanism intended to prevent carbon leakage, i.e., the relocation of production to countries with more lenient emission regulations, and to maintain the competitiveness of EU industries by equalizing the carbon price between domestic and imported products (European Council, 2019).

The while, Indonesia's Carbon Economic Value (NEK) system is oriented towards domestic emission reduction to achieve its Nationally Determined Contribution (NDC) target. Based on Article 47 of Presidential Regulation 98/2021, the implementation of NEK is carried out through four instruments: carbon trading, performance-based payments, carbon levies, and other mechanisms adapted to technological developments. Each unit of emission reduction is captured in the form of Greenhouse Gas Emission Reduction Certificates (SPE-GRK), which can be used for carbon trading, product carbon labeling, and access to sustainable financing (Article 73). Unlike the CBAM certificates, which have a cross-border financial function, the SPE-GRK in Indonesia serves primarily as a domestic accounting instrument reflecting emission reduction achievements.

Structurally, there are several substantive differences between these two policies:

1. First, in terms of policy objectives, NEK is directed towards reducing domestic emission quantities, while CBAM emphasizes carbon price equalization to protect the European Union's internal market.
2. Second, regarding geographical scope, NEK applies within the national jurisdiction of Indonesia, whereas CBAM regulates cross-border transactions between the EU and its trading partners.
3. Third, in terms of policy instruments, NEK combines various economic approaches, including both carbon trading and carbon levies under a single national framework, while CBAM primarily utilizes a single mechanism, namely the adjustment of carbon prices at the border, linked to the EU Emissions Trading System (EU ETS).
4. Fourth, concerning the entities subject to obligations, NEK places domestic businesses as the primary actors responsible for emission reductions, whereas CBAM imposes the obligation on EU importers to report and pay CBAM certificates based on the embedded emissions of imported products.
5. Fifth, in terms of sectoral coverage, NEK encompasses all sectors included in Indonesia's Nationally Determined Contribution (NDC), such as energy, waste, forestry, IPPU, and agriculture, while CBAM remains limited to carbon-intensive sectors like steel, cement, fertilizers, aluminum, hydrogen, and electricity.

These differences are not merely technical, but also reflect philosophical disparities in the orientation of climate policies. CBAM is premised on the logic of "equal carbon cost for

all producers," with the economic principle that every product entering the EU market must bear the same environmental costs. In contrast, Indonesia's NEK is grounded in a sustainable development approach based on national responsibility, with a focus on balancing emission reductions and domestic economic growth. CBAM is external and coercive towards trading partners, while NEK is internal and collaborative, utilizing instruments such as cap-and-trade and performance-based payments.

However, there are a number of elements from CBAM that have the potential to be adapted into the NEK system to strengthen its effectiveness. First, the obligation to report the carbon footprint of exported products (embedded carbon disclosure) can serve as a basis for Indonesia to develop an "Export Product Carbon Footprint Report" as part of a national Green Export Label under the coordination of the Ministry of Trade and the Ministry of Environment and Forestry. Second, the centralized and third-party verified MRV (Measurement, Reporting, Verification) system under CBAM can serve as a model for the establishment of an Integrated National MRV System that integrates data from the industrial, energy, and forestry sectors. Third, the concept of a carbon equivalence mechanism recognized by CBAM can be adapted in the form of a mutual recognition mechanism through derivative regulations of NEK, so that carbon payments in Indonesia can be recognized in international trade transactions and avoid the risk of double carbon pricing.

Thus, the comparison between CBAM and NEK demonstrates that although the two instruments differ in their design, they both contribute to the global convergence towards more transparent and integrated carbon governance. For Indonesia, the alignment between domestic policy and international mechanisms like CBAM is an important step to maintain export competitiveness and strengthen its climate diplomacy position. However, such alignment needs to be pursued while preserving the sovereignty of national climate policy and ensuring that the transition towards a green economy remains inclusive and supportive of sustainable development.

5. Developing a National Carbon Mechanism: Evaluating and Learning from CBAM

The European Union's Carbon Border Adjustment Mechanism (CBAM) provides important lessons for developing countries, including Indonesia, in designing an effective and credible carbon pricing system. Although designed as a cross-border fiscal instrument to prevent carbon leakage, CBAM essentially represents a form of carbon governance based on transparency, verification, and parity of emission pricing across jurisdictions. (OECD, 2022; Mehling et al., 2019) These principles can serve as a reference for the refinement of the Carbon Economic Value (Nilai Ekonomi Karbon) mechanism as regulated in Presidential Regulation No. 98 of 2021, so that Indonesia's domestic policy is not only oriented towards achieving NDC targets, but also compatible with the global carbon trading regime. The urgency of strengthening national carbon governance is also reflected in the FOLU Net Sink 2030 policy, which targets a higher emissions absorption level than the emission level by 2030 as a manifestation of Indonesia's commitment to climate change mitigation (Bappenas, 2025; KLKH, 2024).

One of the most fundamental elements in CBAM is the obligation of mandatory embedded carbon disclosure. Based on Annex V of Regulation (EU) 2023/956, each importer is required to maintain and report actual emissions data of imported products, including the identity of production facilities, operators, verification reports, and the amount of embedded emissions (European Parliament and Council, 2023). This transparency principle can serve as a reference for Indonesia to strengthen the credibility of export data through an "Export Product Carbon Footprint Report" that can be integrated under the Ministry of Trade or the Ministry of Environment and Forestry. As transparency itself is

crucial for the legitimacy and accountability of environmental information (Gupta & Mason, 2014). Moreover, CBAM emphasizes the importance of a centralized and standardized measurement, reporting, and verification (MRV) system. Currently, Indonesia does not have a centralized body responsible for all aspects of carbon pricing. Instead, responsibilities are distributed across several institutions. The Directorate General of Taxes (DGT) is responsible for collecting carbon tax payments. Certain high-emission sectors, such as coal-fired power plants (PLTU), are expected to report their emissions through Tax Notification Letters (SPT) that function similarly to Tax Returns. This fragmentation hinders effective policy coordination, transparency, and the country's ability to demonstrate progress credibly (Qanita & Sadiawati, 2025). In contrast, the CBAM MRV system is based on facility-level data and verified by independent third parties, thereby ensuring the reliability and traceability of emissions data. The complexity of CBAM implementation regarding compliance with World Trade Organization (WTO) rules and European Union Free Trade Agreements is not straightforward. This mechanism must be transparent and impartial, without disguised restrictions or constitutional barriers to international trade (Perdana & Vielle, 2022). Indonesia has thus far established an MRV system within the NEK framework, but it remains sectoral and separated across ministries. Therefore, the lesson to be drawn is the need to establish an Integrated National MRV System that integrates emissions data across industrial, energy, forestry, and waste sectors, and ensures data consistency in national GHG inventory calculations (Ochieng et al., 2018).

From the institutional perspective, CBAM designates competent national authorities (National CBAM Authorities) in each European Union member state to oversee compliance, verification, and law enforcement (Regulation EU 2023/956). Meanwhile, Indonesia has not yet established a single authority in NEK governance; authority remains dispersed across several ministries. In this context, an important lesson to be drawn is the establishment of a Carbon Economic Value Regulatory Body (Badan Pengatur Nilai Ekonomi Karbon/BPNEK) or National Carbon Regulatory Commission that is cross-sectoral in nature. Therefore, the integration of an independent institution is essential to strengthen Indonesia's national carbon policy design.

Another relevant aspect is the carbon equivalent mechanism. Under CBAM, importers can obtain certificate price reductions if they can demonstrate that an equivalent carbon price has been paid in the country of origin. This mechanism indicates the existence of space for policy interoperability between jurisdictions. Indonesia can leverage this principle by developing a mutual recognition mechanism for domestic carbon prices paid under the NEK system, so that carbon payments made by domestic business actors can be recognized equivalently by international trading partners such as the European Union. This step can not only prevent the occurrence of double carbon pricing but also strengthen Indonesia's position in international negotiations regarding the harmonization of carbon pricing instruments. CBAM also adopts a dynamic pricing system that is periodically adjusted to the weekly prices of the European Union carbon market (EU ETS). Importers are required to surrender CBAM certificates periodically, with values following carbon price fluctuations (European Commission, 2023). This approach differs from Indonesia's current system, which still establishes fixed carbon tax rates and has not yet adopted price floor or price ceiling mechanisms.

As for the carbon tax rate in Indonesia is set higher than or equal to the carbon market price per kilogram of carbon dioxide equivalent (CO2e), and in the event that the carbon price in the carbon market is lower than IDR 30 per kilogram of carbon dioxide equivalent (CO2e), the carbon tax rate is set at a minimum of IDR 30 per kilogram of carbon dioxide equivalent (CO2e) or equivalent unit. By learning from CBAM (Ministry of Finance, 2025), Indonesia can actually consider implementing a flexible carbon tax so that carbon pricing

policies are more adaptive to global market dynamics and encourage domestic green investment. However, the implications of this need to be further considered, whether it will be useful and applicable or will require more time and preparation. By adopting lessons from CBAM, Indonesia has the potential to strengthen its bargaining position in international carbon trade diplomacy and accelerate the transition toward a low-emission economy. Strengthening product-based reporting systems, cross-sectoral data integration, and establishing a single carbon authority will become important foundations for the long-term effectiveness of NEK.

CONCLUSION

The implementation of the Carbon Border Adjustment Mechanism (CBAM) by the European Union represents a climate policy that systematically integrates environmental protection into the framework of international trade. While the policy does not directly affect Indonesia's export performance, the border carbon pricing mechanism has the potential to increase export costs and reduce the competitiveness of carbon-intensive products such as steel, cement, aluminium, fertilisers, and other energy-related goods in the global market. This phenomenon highlights that global climate regulation is not merely an environmental concern but also a strategic determinant in international trade, requiring legal, technical, and economic preparedness from developing countries.

From the perspective of international trade law, CBAM raises questions regarding its consistency with the Most-Favoured Nation (MFN) and National Treatment principles under the GATT 1994. Although the European Union maintains that the measure is legitimate for environmental protection purposes under Article XX of the GATT, its implementation still risks discriminatory effects on developing countries that lack equivalent carbon pricing mechanisms. As a developing country whose exports rely heavily on carbon-intensive products, Indonesia faces significant challenges in maintaining legal certainty in trade contracts while aligning its domestic regulations with international standards.

At the national level, Indonesia has established a legal framework for the carbon economic value through Presidential Regulation No. 98 of 2021, Law No. 7 of 2021, and OJK Regulation No. 14/POJK.04/2023. However, implementation remains constrained by several challenges, including a suboptimal Measurement, Reporting, and Verification (MRV) system, weak inter-agency coordination, and limited industrial capacity to report emissions in accordance with international standards. These conditions indicate that Indonesia is not yet fully prepared to obtain mutual recognition from the European Union, leaving the risks of double carbon costs and reduced export competitiveness unresolved.

Research findings suggest that CBAM can serve as a regulatory learning model for Indonesia in developing credible, measurable, and internationally compatible national carbon regulations. The application of transparency, independent verification, and carbon price parity across jurisdictions is essential for creating effective and equitable carbon governance. From an industrial and scientific standpoint, advancing energy efficiency, adopting low-emission technologies, and establishing digital-based reporting systems constitute strategic steps toward making Indonesia's production processes more sustainable while preserving global market competitiveness. Furthermore, the adoption of low-carbon technological innovations and green industrialisation strategies will enable national industries to comply with international environmental standards while enhancing production efficiency and reducing emissions.

Based on these findings, Indonesia needs to strengthen its national carbon governance through institutional integration, the development of a comprehensive MRV system, and the establishment of a central authority responsible for overseeing the governance of carbon economic value. Harmonising domestic policies with the international trade regime is crucial to ensure that global climate policies such as CBAM function not as trade barriers but as

strategic opportunities to reinforce Indonesia's position in green trade diplomacy. In addition, industrial capacity-building, green technology development, and training on emissions reporting and energy efficiency are required to enable effective adaptation across all stakeholders.

Indonesia can also leverage its strategic position within ASEAN to promote regional carbon market integration, thereby strengthening its collective bargaining power in international trade negotiations. Through these measures, Indonesia can transition from being a passive subject of global policy to an active actor within the international carbon pricing framework. This transformation will not only maintain trade continuity and export competitiveness but also contribute to achieving the Sustainable Development Goals (SDGs) and fulfilling the Paris Agreement commitments.

In conclusion, Indonesia's successful adaptation to CBAM requires a comprehensive synergy of regulatory enhancement, technical capacity building, technological innovation, and integrated diplomatic strategy. Such an approach would allow carbon pricing mechanisms to be harnessed as strategic instruments for fostering a sustainable, low-carbon industrial economy.

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