Indonesia Carbon Market White Paper

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INDONESIA CARBON TRADE ASSOCIATION

ASOSIASI PERDAGANGAN KARBON INDONESIA

Foreword

The Paris Agreement, endorsed by 196 nations in 2016, aims to keep global temperature rise well below 2°C, ideally limiting it to 1.5°C. Despite global efforts, we are lagging behind as our current actions could lead to a potential temperature rise of 2.7°C by the end of the century. In a worst-case scenario, where greenhouse gas emissions continue to increase without significant mitigation, the temperature could rise by as much as 4°C or more, according to the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6). As the world increasingly recognizes the urgent need to address climate change, the role of carbon markets in mitigating greenhouse gas emissions has gained significant attention. Indonesia, with its vast tropical forests and rich biodiversity, stands at a pivotal juncture in contributing to global climate solutions. The development of a robust carbon market in Indonesia not only promises to enhance the country's environmental stewardship but also offers substantial economic opportunities and social co-benefits.

This whitepaper explores how the carbon market can help address this financial challenge. Initiated by Presidential Regulation No. 98 of 2021, Indonesia's carbon market framework, which includes carbon taxes and carbon offset credits, is a critical step forward. Currently, carbon pricing is too low to generate sufficient demand for credits, necessitating adjustments. However, Indonesia's vast rainforests and extensive land area present significant opportunities for forestry projects, with an estimated annual emission reduction potential of 247 million tonnes of CO2-equivalent. By 2030, Indonesia could generate up to 1,283 million tonnes of carbon credits each year.

To harness this potential, Indonesia needs to develop an internationally recognised Monitoring, Reporting and Verification (MRV) framework, clarify regulations for international trading, adjust carbon tax pricing, enhance transparency within the SRN-PPI, and provide clear guidance on accounting and tax treatments for carbon credits. Leveraging technology to improve governance is also essential. This whitepaper offers key insights and recommendations crucial for advancing and sustaining Indonesia's carbon market.

PwC, in partnership with the Indonesia Carbon Trade Association (IDCTA), is committed to exploring and maximising the potential of Indonesia's carbon market, supporting the country's NDC commitments and economic growth through stakeholder engagement and infrastructure development.

We hope you find our findings both enlightening and thought-provoking, and we wish you a pleasant read.

Yuliana Sudjonno
Partner

PwC Indonesia

Foreword

Dr. Riza Suarga
Chairman

Indonesia Carbon Trade Association (IDCTA)

Quoting Indonesia's Presidential Special Envoy for Climate and Energy, Hashim Djojohadikusumo (Bisnis.com, October 29, 2024), Indonesia is progressively advancing its carbon credits to the global market. In 2018–2020 alone, the country's carbon market potential was an impressive 577 million tonnes of CO2e, and from 2021 to 2023, it reached 600 million tonnes CO2e—an upward trend that reflects the new administration's commitment to expanding its carbon market both domestically and internationally.

For project owners, developers, and investors alike, navigating Indonesia's carbon market regulations has been a journey marked by highs and lows, especially over the past three years. This period witnessed a surprising moratorium on international trading, the revocation of several high-integrity nature-based projects, and an ongoing uncertainty surrounding the future of international carbon offset mechanisms. To understand the whole concept holistically, I learned to appreciate that the Government is very serious about ensuring the delivery of high quality projects from Indonesian soils.

However, an international analyst remarked that Indonesia may have missed a "golden moment" to emerge as a leader in the global carbon economy, with 2021–2022 recognized as a high point for the international carbon market. Yet soon after, a series of global challenges—the COVID-19 pandemic, The Guardian's investigative reporting, the Russia-Ukraine conflict, and the ongoing Israel-Gaza-Lebanon crisis—have collectively led to a market downturn. Carbon credits are now firmly in a buyer's market, no longer favourable to sellers. Meanwhile, neighbouring countries, including Malaysia, Thailand, Vietnam, and Papua New Guinea, have been actively preparing to enter the carbon supply chain, supported by robust regulations aligned with international standards and registries. For Indonesia to regain its position, a comprehensive Carbon Economy Ecosystem Roadmap is essential—not just regulatory reform but a clear assurance that carbon investment is a sustainable, long-term endeavour.

IDCTA recognizes the critical importance of addressing the real challenges from market players' perspectives within Indonesia's carbon economy today. We are committed to exploring ways to maximise our potential and support President Prabowo and his cabinet to secure Indonesia's place in future climate action. In closing, I would like to extend our sincere gratitude to PwC Indonesia for their invaluable partnership in bringing this White Paper to life.

Executive Summary

The Paris Agreement, signed by 196 countries in 2016, aims to limit global temperature rise to below 2°C, with efforts to cap it at 1.5°C. Despite these global commitments, current projections indicate a potential temperature rise of 2.7°C by the century's end if emission rates persist. Indonesia, for instance, has set ambitious Nationally Determined Contributions (NDCs) to reduce emissions by 915 million tonnes of CO2 equivalent (MTCO2-e) annually by 2030, but actual reductions in 2022 were only 429 MTCO2-e. Achieving these targets requires an estimated investment of US$281.23billion, a sum that cannot be met solely by the state budget. This whitepaper highlights the potential of the carbon market to bridge this financial gap.

The domestic carbon market began with the enactment of Presidential Regulation No. 98 of 2021, which lays out the framework for national carbon economic valuation (Nilai Ekonomi Karbon, or NEK). Through this framework, carbon is valued through two mechanisms: carbon tax and carbon offset credits. However, the current carbon pricing is set too low to effectively create demand for carbon credits, ultimately hindering optimal emission reductions from the carbon market. Therefore, Indonesia will need to adjust these carbon pricing mechanisms.

Indonesia operates two types of carbon markets: the compliance market and the voluntary market. A major regulatory uncertainty involves the mechanisms of Corresponding Adjustment (CA) and Non-Corresponding Adjustment (NCA). Under the CA mechanism, emission reductions from international carbon trading cannot be claimed towards Indonesia's NDCs, whereas emissions traded without CA still count towards Indonesia's NDCs. These mechanisms are still under development, creating uncertainty and limiting foreign investment.

Despite these challenges, Indonesia holds significant potential to be a major player in the global carbon market. ItsIts large territory and vast coverage of rainforest provide substantial opportunities for forestry projects, with an estimated emission reduction potential of 247 MTCO2-e per year. According to the Coordinating Ministry for Maritime Affairs and Investment of the Republic of Indonesia, as much as 1,283 million tonnes of carbon credits can be generated annually from all sectors by 2030, which would generate an economic value of approximately US$7.3billion to US$16.7billion, after accounting for the amount required to fulfil the NDC targets.

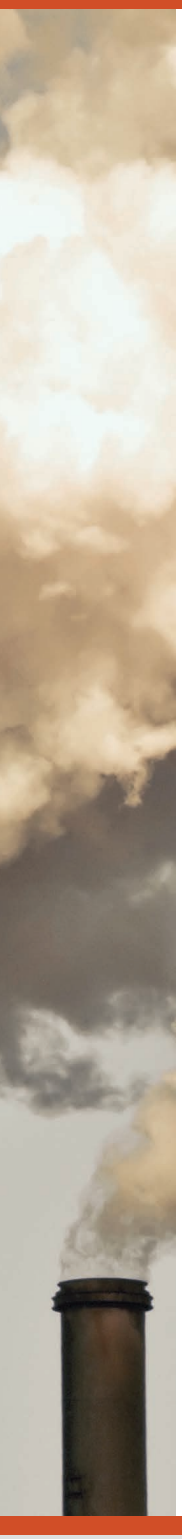
In order to drive the Indonesian carbon market forward, these key points will have to be considered.

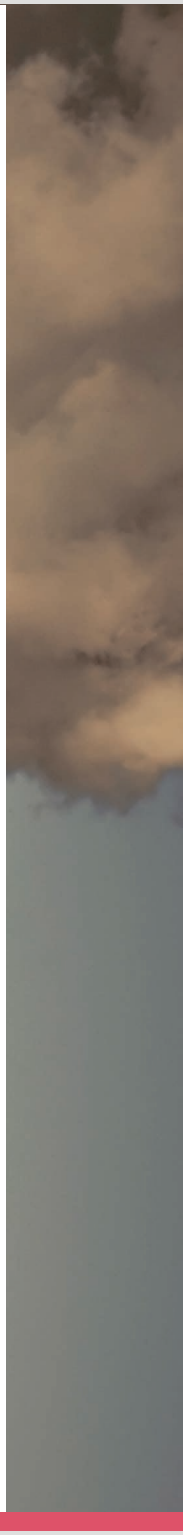
1. **Develop an internationally recognised MRV framework to enable high-quality carbon credits and provide policy support to enable seamless international exports of carbon credits.** Indonesia should develop an internationally recognised MRV framework and align its carbon project methodologies with global standards. Enhancing transparency and collaborating with experienced verifiers will improve the credibility of Indonesian carbon credits and support seamless international exports.
2. **Clarify the regulations surrounding international carbon trading to support the feasibility of carbon projects for investors.** Clarifying regulations for international carbon trading is essential to attract investments in Indonesia's carbon market, as the current lack of detailed guidelines creates uncertainty and complicates financial planning for investors. Establishing clear positions on international trading will increase carbon pricing and make projects more feasible for investors.

3. **Clarify the mechanisms of Corresponding Adjustment (CA) and Non-Corresponding Adjustment (NCA).** Clarifying the mechanisms of Corresponding Adjustment (CA) and Non-Corresponding Adjustment (NCA) is essential for achieving Indonesia's NDCs and preventing double-counting of carbon credits. Addressing these uncertainties and implementing regular monitoring will enhance investor confidence and balance national and market needs, potentially with incentives for NCA projects.
4. **Revisit the current carbon tax base pricing and the related sectoral thresholds.** The stagnation in Indonesia's carbon market is partly due to a lack of domestic demand and clear mechanisms. To address this, the government should implement a more ambitious cap-and-trade system across various sectors and adjust the carbon tax base price to align with global standards, thereby encouraging companies to purchase carbon credits and invest in emission reduction measures.
5. **Enhance project information transparency within SRN-PPI.** Enhancing the transparency of the SRN-PPI by providing comprehensive project details, similar to international registries, will build greater stakeholder confidence, attract international investors, and promote the long-term sustainability of Indonesia's carbon market. This can be achieved by offering access to Project Design Documents (PDDs), Monitoring Reports, and Feasibility Studies, among other relevant documents.
6. **Communicate guidance on accounting and tax treatments over carbon credit transactions.** Clear guidance on accounting and tax treatments for carbon credit transactions is essential for project developers, buyers, and sellers to understand the financial implications. Relevant standards or frameworks can promote consistent and accurate measurement and reporting, thereby improving market participants' ability to navigate related instruments and understand the impact on their financial statements.
7. **Leverage technology to support the governance and efficiency surrounding Indonesia's carbon market.** Implementing advanced technologies like blockchain for transparent data recording and real-time analytics can improve the SRN-PPI registry system. This will allow for accurate tracking and verification of carbon credits which would enhance the system's reliability and efficiency.

This white paper, in collaboration with the Indonesia Carbon Trade Association (IDCTA), aims to explore and maximise the Indonesian Carbon Market's potential in supporting Indonesia's NDC commitment and economic growth through stakeholder involvement and infrastructure enhancement.

Contents





Glossary

Blended Finance	A financing approach that combines public and private funds to support development projects, sharing risks and leveraging additional investment.
Corresponding Adjustment (CA)	A mechanism under Article 6 of the Paris Agreement which ensures that carbon credits sold from one country to another are properly accounted for to avoid double counting of emission reductions.
Carbon Capture and Storage (CCS)	Technologies or approaches for capturing and storing carbon dioxide emissions from industrial processes to prevent them from entering the atmosphere.
Carbon Credit	A measurable, verifiable GHG emissions reduced from a certified reduction activity.
Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)	An international scheme to offset and reduce carbon emissions from aviation.
Carbon Pricing	An instrument that assigns a monetary value to GHG emissions, typically implemented through mechanisms like carbon taxes, emissions trading systems (ETS), and carbon credits.
Carbon Taxes	Taxes imposed on the carbon content of fuels, aimed at reducing carbon dioxide emissions by increasing the cost of emitting carbon.
Certified Emissions Reduction (CER)	Certificates issued under the Kyoto Protocol for emission reductions from Clean Development Mechanism (CDM) projects that can be traded in the compliance market.
Clean Development Mechanism (CDM)	A market-based mechanism under the Kyoto Protocol that allows developed countries to fund emission reduction projects in developing countries and earn CERs.
Compliance Market	The regulated market where carbon credits are traded to meet legally binding emission reduction targets.
Emission Reduction Certificates (ERC)	Certificates representing verified emission reductions, also known as Sertifikat Pengurangan Emisi Gas Rumah Kaca (SPE GRK) in Indonesia.
Emissions Trading System (ETS)	A market-based approach to provide economic incentives for achieving reductions in the emissions of pollutants.
Gold Standard	A certification standard for carbon offset projects that ensure high environmental integrity and sustainable development benefits.

Green Bonds	Bonds issued to finance projects that have positive environmental benefits, such as renewable energy or conservation projects.
Joint Implementation (JI)	A mechanism under the Kyoto Protocol where developed countries can undertake emissions-reducing projects in other developed countries and share the resulting CERs.
Monitoring, Reporting, and Verification (MRV)	Systems and processes used to ensure accurate measurement, reporting, and verification of greenhouse gas emissions and reductions.
Nationally Determined Contributions (NDCs)	Plans submitted by countries under the Paris Agreement that outline their targets and strategies for reducing greenhouse gas emissions.
Nature-based Solutions	Strategies that involve the conservation, restoration, and sustainable management of ecosystems to address societal challenges, such as climate change, and provide benefits for both biodiversity and human well-being.
Nilai Ekonomi Karbon (NEK)	Indonesia's Carbon Economic Value framework, enacted through Presidential Regulation No. 98 of 2021, which establishes a framework for carbon trading and emission reduction.
Non-Corresponding Adjustment (NCA)	A mechanism under Article 6 of the Paris Agreement when carbon credits are transferred without accounting adjustments, allowing the project's country of origin to count the emission reductions towards its NDC.
Paris Agreement	An international treaty signed in 2016 by 196 countries with the aim to limit global temperature rise to below 2°C, with efforts to limit it to 1.5°C.
Project Design Document (PDD)	A detailed document outlining the design and implementation of a carbon project, often required for validation and verification.
Public-Private Partnerships (PPP)	Collaborative agreements between public and private sectors to finance, build, and operate projects, often used in infrastructure development.
SRN-PPI	A system overseen by the Ministry of Environment and Forestry (MoEF) in Indonesia to track and report climate action progress.
Verified Carbon Standard (VCS)	An international standard for certifying carbon reduction projects and issuing carbon credits.
Voluntary Carbon Market (VCM)	A market in which carbon credits are traded on a voluntary basis, typically by private companies and organisations seeking to offset their emissions.
Voluntary Emissions Reduction (VER)	Carbon credits generated from voluntary carbon projects and verified according to international standards, traded in the voluntary carbon market.

1 Introduction

1.1 Background on carbon credit and their importance in mitigating climate change

In 2016, 196 countries signed the Paris Agreement, aiming to keep global temperature rise below 2°C, with efforts to limit it to 1.5°C. To achieve this, global greenhouse gas emissions must be reduced by 43% by 2030[1]. Under this agreement, countries worldwide have submitted their Nationally Determined Contributions (NDCs) which outline their climate targets and decarbonisation plans. This requires significant investment in renewable energy, energy efficiency, and other decarbonisation efforts.

Despite global efforts, the world is not on track to meet the 1.5°C target set by the Paris Agreement. Projections indicate that if current emission rates continue, temperature will rise by around 2.7°C by the end of the century[2]. For instance, Indonesia's actual emission reductions still fall short of its NDC targets. By 2030, Indonesia aims to reduce 915 MTCO2-e of emissions annually, but the actual emission reduction in 2022 was recorded at only 429 MTCO2-e[3]. To achieve Indonesia's NDC targets by 2030, an estimated investment of approximately $281.23 billion USD (or 4,002 trillion IDR) will be required[4]. This substantial amount cannot be covered solely by the state budget (APBN). Therefore, the carbon market has the potential to bridge this financial gap and serve as a key driver in achieving Indonesia's NDC goals.

Countries are now actively developing and implementing decarbonisation strategies tailored to their significant emission sources. One of the keys to successful decarbonisation is technological development, in terms of improving existing technology as well as developing new, green technology. It is undeniable that developing a technology requires large sources of funds or capital. For several developing countries, this is one of the biggest challenges in achieving their climate targets[5].

To overcome this problem, a supporting instrument for decarbonisation, namely carbon pricing, was developed. Carbon pricing is an instrument that measures the monetary value of GHG emissions, usually in the form of a price for the carbon dioxide (CO2) emitted. It is estimated that two-thirds of all NDCs submitted under the Paris Agreement consider using the carbon pricing instruments to achieve their emissions reduction targets Carbon pricing comes in many forms, such as the emissions trading system ("ETS"), carbon credits, carbon taxes, and result-based climate finance[6]. For example, China's National ETS, which initially focused on the power sector, is expanding to include cement, steel, and aluminium industries.

For references, please see the Endnotes on page 46.

This expansion is set to be implemented by the end of 2024[7]. This move demonstrates how carbon pricing can be an effective tool for various industries and countries, providing a pathway to reduce emissions while maintaining economic viability.

Overall, carbon pricing instruments play an important role in driving the transition towards more effective and aggressive decarbonisation measures, with the end goal of achieving the Paris Agreement targets by 2050. Carbon credits, as one of the instruments to decarbonisation, provide new opportunities for businesses by opening up new revenue streams and offering capital to adopt green technology and business practices. Additionally, purchasing carbon credits can help companies meet their short or medium climate targets by cutting off their GHG emissions, while aiming to achieve long-term targets. Through the carbon market, governments and non-state actors can participate in trading greenhouse gas emission credits to achieve their climate targets and provide funds to climate actions.

What is a carbon credit?

By definition, carbon credits or carbon offsets can be defined as tradable certificates that represent the reduction, avoidance, or result of one metric ton of carbon dioxide equivalent (CO2e) achieved by a certified carbon project. The main idea behind carbon credits is to assign a monetary value to the emission reduction results from project or programme based activities as an incentive to increase emissions reduction efforts. It is considered by the United Nations ("UN") as an effective and necessary strategy for countries to achieve their climate targets by the end of 2050.

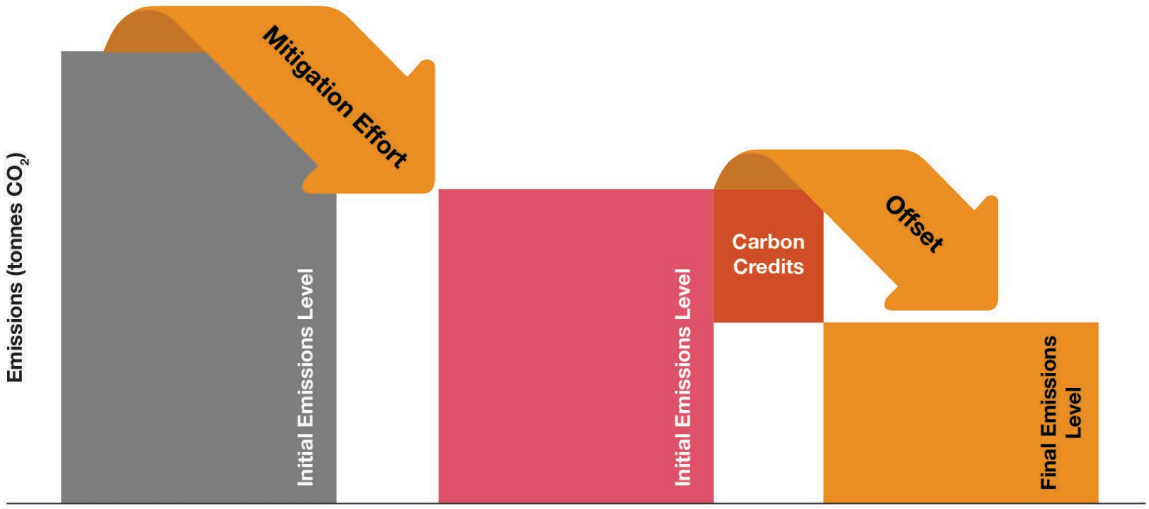


Figure 1.1 Illustration of the carbon credits use for offsetting emissions

Source: #pasarkarbon: Pengantar Pasar Karbon untuk Perubahan Iklim, PMR Indonesia, 2021

Carbon credit is one of the key elements in the market-based mechanisms first introduced by the Kyoto Protocol. One important outcome of this protocol is the establishment of market-based mechanisms to assist countries in meeting their climate commitments[8]. In achieving its goals, the Kyoto Protocol allows the implementation of three types of flexible market-based mechanisms:

- Emissions trading, where coequal developed countries are able to buy and sell GHG emissions;
- Clean Development Mechanism ("CDM"), where developed countries are able to fund/purchase the results of reducing GHG emissions from projects located in developing countries; and
- Joint implementation ("JI"), where several developed countries are able to jointly develop climate change mitigation activities located in developed countries where the results of emission reduction are shared according to agreement.

These mechanisms view carbon dioxide (CO2) emission as a market commodity and provide the monetisation opportunities as part of incentives provided to the states. Furthermore, this became the basis for the first emergence of emission reduction certificates or currently referred to as carbon credits and marks the basis international carbon trading.

Compensating all the challenges faced by the countries, the Paris Agreement strengthened the international carbon trading system outlined in Article 6 paragraph 1:

"Parties recognise that some Parties choose to pursue voluntary cooperation in the implementation of their nationally determined contributions to allow for higher ambition in their mitigation and adaptation actions and to promote sustainable development and environmental integrity."

This article creates opportunities for each country to collaborate and cooperate to achieve the NDC's target through trading carbon credits in the international carbon market. Under these provisions, countries are able to transfer carbon credits, earned through the reduction of GHG emissions, and create new sources of climate finance. This practice enhances the carbon credits features as a tool against climate change as well as a financial instrument.

Carbon credits can be generated from carbon projects that have been verified by an independent verification institution. A carbon project will carry out mitigation actions or carbon sequestration activities with certain targets. The amount of carbon absorbed will be verified by an independent institution and the results of the verification will be published as a letter or emission reduction certification that can be traded on the carbon market. By having this certificate, a company can recognise carbon absorption as their own, so that it can reduce the amount of carbon emissions resulting from the company's activities. For GHG emitters, carbon credit provides substantial assistance to achieve short and medium term climate targets. While for sellers, the monetary incentives obtained become a new source of funding for the development of more advanced technologies, thereby increasing opportunities to advance the rate of emissions reduction.

There are currently two types of carbon credits traded in the compliance and voluntary carbon markets:

- **Voluntary Emissions Reduction ("VER")**: Carbon credits are emission reductions released from voluntary carbon projects and verified in accordance with applicable international standards (e.g. Verra and Gold Standard). These credits are traded on the voluntary carbon market ("VCM").
- **Certified Emissions Reduction ("CER")**: Certificate of emission reduction originating from the Kyoto Protocol market mechanism. These certificates can be traded on the compliance market in the form of Clean Development Mechanism ("CDM"), Joint Implementation and Europe Unit Allowance.

The main difference between VER and CER is that there is a third-party certification institution which regulates the CER (but not for the VER).

1.2 Objectives of the Carbon Market White Paper

This white paper, in collaboration with the Indonesia Carbon Trade Association (IDCTA), aims to explore and maximise the potential of Indonesian Carbon Market's in supporting Indonesia's NDC commitment and economic growth through stakeholder involvement and infrastructure enhancement. This white paper aims to explore and maximise the potential of Indonesia's carbon market from multiple perspectives. To achieve this, we have evaluated the development potential of the carbon market in Indonesia, focusing on the implementation of existing carbon trading mechanisms. Our review covers the current state of the carbon markets, including regulatory frameworks, existing carbon projects, and market mechanisms. This analysis identifies key opportunities and challenges in implementing carbon trading mechanisms. Based on this comprehensive information, we offer several detailed recommendations for policymakers, businesses, and other stakeholders to capitalise on carbon market opportunities and address related challenges.

2 Understanding the Indonesian carbon market

2.1 Indonesia's commitment towards achieving net zero

In 2023, the global decarbonisation rate was only 1.02%. To limit global warming to below 1.5°C above pre-industrial levels, the number needs to increase to 20.4%[9]. These figures showcase the urgent need for global efforts across multiple sectors to mitigate climate change.

Indonesia's Enhanced NDC targets are a significant step in its climate action agenda. The target consists of Indonesia's goals of reducing emissions by 31.82% compared to business-as-usual (BAU) levels in 2030, without international support and reducing emissions by 43.20% compared to BAU by 2030, with international support. The Ministry of Environment and Forestry (MoEF) oversees these targets through the National Climate Change Registry System (SRN-PPI). Indonesia also aims for net-zero emissions by 2060, as outlined in the LTS-LCCR 2050. This commitment is reflected in policies promoting renewable energy, forest conservation, and sustainable land use. A key initiative is the Nilai Ekonomi Karbon (Carbon Economic Value), which integrates the economic impacts of carbon emissions into national planning and encouraging low-carbon technologies.

To achieve its NDC targets and control GHG emissions, Indonesia has implemented its Carbon Economic Value, or Nilai Ekonomi Karbon ("NEK"). This is enacted through Presidential Regulation No. 98 of 2021, which establishes a framework for carbon trading and emission reduction, initially focusing on the power and forestry sectors. However, more sectors will also be covered, which will include, industry, agriculture, and waste management. Through the implementation of NEK, it allows companies to trade emissions within the country, which serves as the basis for the carbon market in the country.

In the context of decarbonisation efforts through carbon credit, Southeast Asian countries play a crucial role. The appropriate use of carbon credits in the region can significantly direct capital into nature-based solutions and technological innovations. These efforts can help remove carbon from the atmosphere, reduce emissions from existing projects, or prevent emissions altogether. Protecting high-quality natural forests and mangroves is a key investment strategy, preserving significant carbon stocks in forests, peatlands, and coastal zones at risk of deforestation. By protecting terrestrial forests at risk of deforestation, the Southeast Asian region is estimated to generate approximately USD19.6 billion annually[10].

Additionally, countries like Malaysia, Indonesia, and Vietnam, which have forest cover of about 55%, 53%, and 47% respectively, offer numerous opportunities for forest management, afforestation, and REDD+ projects[11].

The utilisation of technology is crucial for meeting these targets, but both investment and technology take time to implement. Thus, carbon credits are essential to bridging the gap. Leveraging the carbon market can effectively address this financial shortfall and accelerate progress toward Indonesia's NDC goals.

In 2023, Indonesia's carbon market made notable progress with the development of a carbon trading mechanism under the NEK framework, driven by Presidential Regulation No. 98 of 2021. Initially focusing on coal-fired power plants, the first phase set emission caps and introduced carbon credit trading (SPE-GRK), primarily from renewable energy projects. Increasingly, on 26 September 2023, the Indonesian Stock Exchange launched the Indonesia Carbon Exchange ("IDX Carbon"), a significant step in Indonesia's commitment to achieve net zero emissions by 2060 through the support of a voluntary carbon market.

This step marks the start of Indonesia's evolving carbon market, a critical factor in achieving its climate goals. Key stakeholders, including government bodies, financial institutions, regulatory agencies, private companies, and NGOs, play essential roles in ensuring the market's effectiveness and sustainability. Their collaboration drives emission reductions, promotes green technology innovation, and ensures compliance with environmental standards.

2.2 Key stakeholders and their roles

The dynamics of the carbon market in Indonesia involve several key stakeholders. The diagram below maps out these stakeholders and illustrates the flow of opportunities and responsibilities within the market.

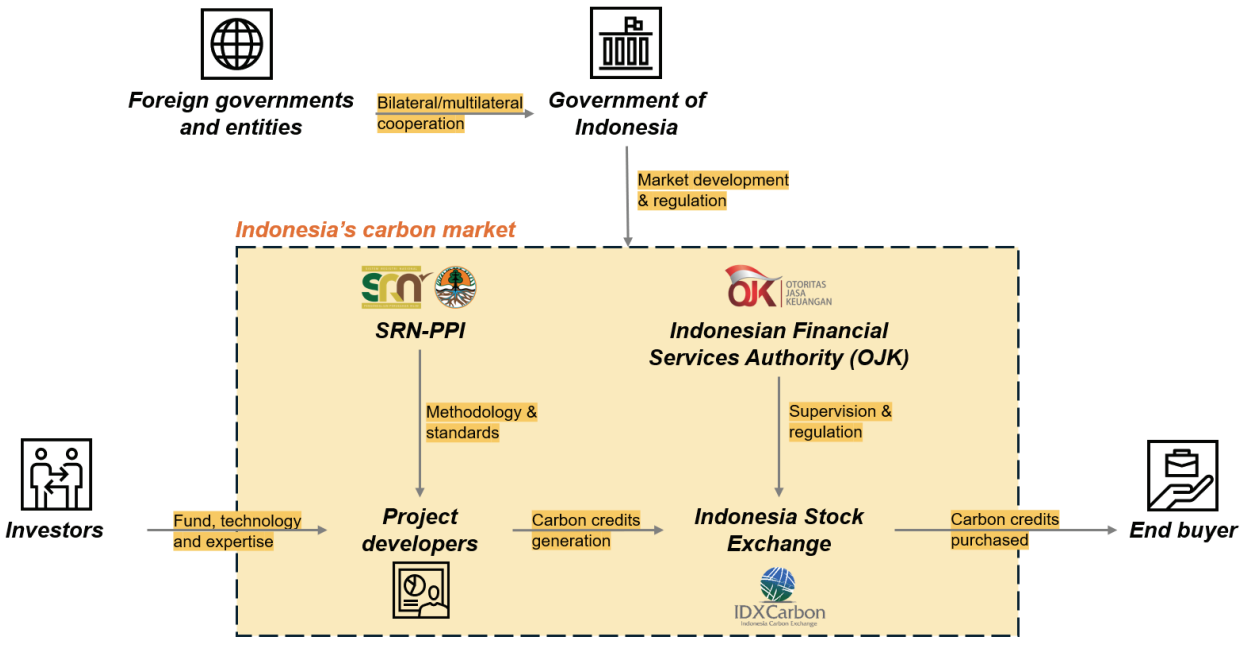


Figure 2.1 A brief overview of the stakeholders of Indonesia's carbon market and their roles

The role of government agencies in regulating and promoting the carbon market

Government agencies play a pivotal role in regulating and promoting the carbon market by establishing robust standards, providing financial incentives, and ensuring transparency and accountability. In Indonesia, the Government, the Financial Services Authority (OJK), and the Indonesia Stock Exchange are key players in driving these efforts, ensuring the market's integrity and fostering investor confidence. The role of each key player is discussed below:

a. Government of Indonesia

The Government of Indonesia (GoI) plays a crucial role in developing and regulating carbon markets. Its key responsibilities include monitoring the market and expanding carbon trading across various sectors to achieve Nationally Determined Contributions (NDC) targets under international climate agreements. Future regulatory expansions aim to include more sectors, enhancing the scope and impact of carbon trading, with projected annual revenues between USD1 billion and USD15 billion. The government fosters collaboration between state-owned enterprises (SoEs) and private companies to drive market demand and set benchmarks.

To regulate and promote the carbon market, the GoI enacted Presidential Regulation No. 98 of 2021 on Carbon Pricing. This regulation aims to reduce greenhouse gas (GHG) emissions, enhance climate resilience, and establish the Economic Carbon Value (NEK) to meet NDC targets, including a 2030 GHG Emission Baseline of 2,869 million tons of CO2 equivalent.

The regulation outlines efforts to achieve NDC targets, NEK implementation procedures, transparency, monitoring, capacity building, finance, and the role of the Ministry of Environment and Forestry (MoEF). MoEF Regulation No. 21 of 2022 further details mechanisms for domestic and international carbon trading, buffer obligations, voluntary carbon markets, and mutual recognition.

In addition to Indonesia's efforts, other countries have made significant strides in regulating the carbon market. For instance, Japan has significantly contributed through initiatives like the Joint Crediting Mechanism (JCM) with Indonesia. The JCM supports low-carbon development through financial aid, capacity building, and technology transfer in sectors such as energy efficiency, renewable energy, deforestation, waste management, and manufacturing. It also facilitates carbon credit distribution and potential carbon trading mechanisms. Japan offers three financing schemes for low-carbon projects:

- **Model Project**: subsidises up to 50% of capital costs.
- **Japan Fund for JCM (JFJCM)**: provides funding incentives up to 10% of project costs through the Asian Development Bank.
- **The Demonstration Project**: offers grants for low-carbon technologies, requiring a Memorandum of Understanding with Indonesian government institutions.

Similarly, Indonesia partners with Norway on carbon market initiatives, building on their REDD+ collaboration since 2010. Norway pledged up to USD 1 billion for Indonesia's rainforest protection, with funds based on verified emission reductions. The renewed 2021 agreement emphasises results-based payments and carbon trading, aiming to meet climate targets and promote sustainable practices.

b. Indonesian Financial Services Authority / Otoritas Jasa Keuangan ("OJK")

The Indonesian Financial Services Authority (OJK) supervises the domestic carbon market, ensuring its integrity and efficiency. OJK Regulation No. 14 of 2023 establishes carbon trading as a recognised financial transaction, setting rules and standards, monitoring compliance, and preventing fraud. This integration aims to promote transparency, increase investor confidence, and support sustainable initiatives, aligning with Indonesia's climate goals.

OJK, along with other ministries like the Ministry of Energy and Mineral Resources (MEMR), which launched the Indonesian Emissions Trading Scheme (ETS) in 2023, plays a crucial role in regulating the carbon market. Law No. 4 of 2023 assigns OJK the responsibility for overseeing financial services, including carbon exchanges. Articles 8, 22, and 25 of this law grant OJK authority over carbon trading, requiring compliance and permission for trading activities.

OJK has appointed the Indonesia Stock Exchange (IDX) as the Carbon Exchange Operator, granting it a business licence through Decree number KEP-77/D.04/2023.

c. Indonesia Stock Exchange

The Indonesia Stock Exchange (IDX) has been appointed by the Financial Services Authority (OJK) to organise the carbon exchange in Indonesia, as per SP 132/GKPB/OJK/IX/2023. Initially, carbon trading will focus on high-quality units from the electricity (ETS) and forestry sectors.

IDX Carbon, established by the Indonesian Stock Exchange, is the official platform for trading carbon units. It plays a crucial role in climate change mitigation through market-based mechanisms, facilitating the buying and selling of carbon credits. This enables businesses to meet emissions reduction targets transparently and efficiently. IDX Carbon ensures compliance with national regulations and international standards, fostering market integrity and trust.

By enhancing liquidity, encouraging investment in low-carbon technologies, and supporting GHG emission reduction goals, IDX Carbon significantly contributes to Indonesia's climate objectives. It serves as a platform for investors and businesses to participate in Indonesia's compliance-based carbon market.

The role of private sector companies' participation in carbon credit projects

Given that in 2023 Indonesia's state budget realisation was only IDR3,121 trillion, contributing just 14.9% to the GDP of IDR20,892.4 trillion, there is a significant opportunity for the private sector to bridge these gaps. The private sector drives market growth by investing in innovative carbon reduction projects and technologies, developing and funding projects that generate carbon credits, and enhancing market integrity. Their involvement is essential for achieving national decarbonisation goals and effectively addressing climate change.

Project developers, including state-owned enterprises (SoEs) and private companies, are key players in Indonesia's carbon market. They engage in projects such as reforestation and sustainable land management, which help sequester carbon dioxide, improve biodiversity, and support local communities through job creation and capacity building. These investments require strategic long-term planning and collaboration among various stakeholders to ensure their success and sustainability.

By combining environmental management with social responsibility, these stakeholders ensure that carbon market activities offer more than just emission reductions. Their efforts promote sustainability, strengthen market integrity, and enhance ecological and socio-economic resilience in Indonesia.

To lead these efforts, seven major SoEs have been mandated to spearhead decarbonisation initiatives: Perum Perhutani (forestry), Pertamina and PLN (energy), Semen Indonesia, Pupuk Indonesia, MIND ID (mining), and Perkebunan Nusantara (agriculture). These SoEs have a significant impact on national emissions and are committed to reducing their carbon footprint, aligning with the government's sustainable agenda.

The role of financial institutions and investors in supporting the market

Financial institutions and investors play an important role in sustaining the carbon market. They connect buyers with sellers, provide the capital needed to grow the market, and contribute to its development by:

- **Developing market infrastructure**: Financial institutions help develop essential infrastructure like exchanges and trading platforms, ensuring the carbon market functions efficiently.
- **Project financing**: They finance projects that generate carbon credits, helping companies meet regulatory requirements and reduce emissions.
- **Promoting ESG practices**: By issuing green bonds and other sustainable financial products, they promote environmental and social benefits, aligning with global sustainability goals. This attracts investors who prioritise ESG criteria.
- **Advocating market dynamics**: Financial institutions see the need for better infrastructure to support the carbon market's supply and demand. They advocate for clear regulations, schemes like primary dealers and market makers, and foreign participation to enhance market robustness and efficiency.

2.3 Navigating the carbon credit regulatory landscape

Climate mitigation actions are central to the carbon pricing mechanism, which is regulated across various sectors and subsectors such as energy, waste, IPPU, agriculture, forestry, transportation, waste management, power generation, plantations, and industry. Presidential Regulation No. 98 of 2021 delegates authority to specific ministries for coordinating these sectors.

For example, the Ministry of Energy and Mineral Resources (MoEMR) oversees the transportation, construction, and industrial sectors. This delegation has led to the establishment of a carbon pricing regulatory framework, with sector ministries regulating carbon pricing through ministerial regulations.

Businesses need a comprehensive understanding of these regulations to navigate carbon pricing and carbon trading in each sector and understand their interconnections.

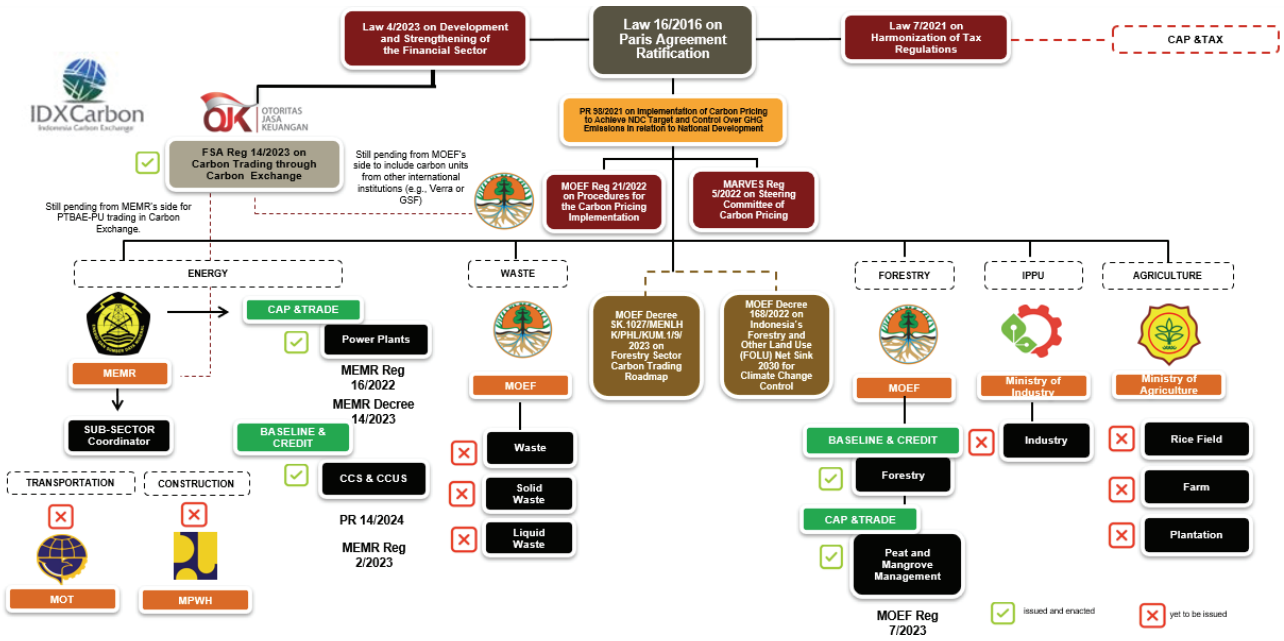


Figure 2.1 Illustration of Current Indonesian Carbon Pricing Regulatory Framework

Source: PwC Legal Indonesia

As illustrated in the Figure 2.1 above, MoEF oversees the general procedures for the implementation of carbon pricing through MoEF Regulation No. 21 of 2022 concerning Procedures for Carbon Pricing Implementation. Specifically for the forestry sector, MoEF issued a distinct regulation regarding carbon trading procedures with MoEF Regulation No. 7 of 2023 concerning the Carbon Trading Implementation for Forestry Sector. In addition, carbon players need to consider the other forestry regulations such as: (i) Government Regulation No. 23 of 2021 on Forestry and (ii) MOEF Regulation No. 8 of 2021 on Forest Management and Preparation of Forest Management Plans, as well as Forest Utilisation in Protected Forests and Production Forests.

In the energy sector, MEMR implements MEMR Regulation No. 16 of 2022 concerning Procedures for Determining Carbon Prices for the Electricity Generation Subsector. Forestry and energy are key sectors in achieving NDC targets, and forestry plays an important role in the carbon net sink approach under the Indonesia FOLU Net Sink 2030 initiative. Table 2.1 below shows the scopes of each regulation related to carbon market in Indonesia:

Table 2.1 Regulations Related to Indonesian Carbon Market

No.	Regulations	Descriptions
1.	Law No. 16/2016	Ratification of Paris Agreement (including the provisions related to carbon pricing)
2.	Law No. 7/2021	General introduction and provisions of carbon tax
3.	Law No. 4/2023	General introduction and provisions of carbon exchange (bursa karbon)
4.	Presidential Regulation No. 14 of 2024	Implementation of carbon capture and carbon storage
5.	Presidential Regulation No. 98 of 2021	Carbon pricing mechanism in Indonesia
6.	MARVES Reg No. 5/2022	Provisions on the steering committee of carbon pricing
7.	MoEF Regulation No. 21 of 2022	Carbon pricing implementation in Indonesia, including the detailed procedures of carbon trading
8.	MEMR Regulation No. 16 of 2022	Carbon trading implementation for the power plant sub-sector
9.	MEMR Regulation No. 2/2023	Implementation of CCS and CCUS in upstream oil and gas business activities
10.	MoEF Regulation No. 7 of 2023	Carbon trading implementation for the forestry sector
11.	OJK Regulation No. 14 of 2023	Carbon exchange (bursa karbon) mechanism
12.	MEMR Decree No. 14/2023	PTBAU determination for coal fired power plants of PLN phase 1
13.	MOEF Decree No. SK.1027/MENLHK/PHL/KUM.1/9/2023 of 2023	Forestry sector carbon trading roadmap
14.	MOEF Decree No. 168/2022	Forestry and Other Land Use (FOLU) Net Sink 2030 for climate change control

Based on the Indonesian regulatory framework, carbon pricing is commercialised through carbon trading, results-based payments (RBP), and carbon tax. Carbon trading includes emission trading and emission offset, domestically and internationally.

- **Emission Trading**: This "cap and trade" mechanism allows business entities with GHG emissions exceeding their allowance to trade emission permits. These permits, known as Technical Approval for Emission Allowance for Business Entity (PTBAE PU), were issued on November 4, 2023, for the power generation sub-sector and mangrove and peatlands in the forestry sector. In January 2023, MoEMR issued PTBAE PUs for 99 coal-fired power plants.
- **Emission Offset:** This involves reducing GHG emissions through mitigation measures to compensate for emissions from other activities. Emission offsets are traded as Emission Reduction Certificates (ERC) or *Sertifikat Pengurangan Emisi Gas Rumah Kaca* (SPE GRK).

In comparison, China's carbon market has made significant strides in establishing a comprehensive regulatory framework to manage carbon emissions trading, with the Interim Regulations for the Management of Carbon Emission Trading coming into effect on 1 May 2024, marking the country's first specialised legislation in this field. These regulations define carbon emissions trading-related activities and stipulate key management tasks for national and local authorities, including identifying key emitting entities, submitting emission data, verifying annual reports, allocating and surrendering Carbon Emission Allowances (CEAs), and market trading. China's approach emphasises full process management, flexibility, and severe penalties for non-compliance, covering all main components of carbon emissions trading and specifying legal responsibilities for various entities involved. The Ministry of Ecology and Environment (MEE) has issued additional measures and rules to support this framework, creating a robust foundation for the National Emissions Trading System (ETS)[12].

Table 2.2 An overview of carbon markets in different countries[13]

Carbon Market	Mechanisms	Regulatory drivers for demand	CA/NCA mechanisms[14]
Indonesia	ETS and offset	Carbon tax (draft in progress); Emission caps for limited sector	CA required in all international trade
China	ETS and offset	Emission caps and government policies	CA not required, allows for NCA
US	Voluntary carbon markets and regional cap-and-trade systems (e.g., California, RGGI)	Emission caps and government incentives in some states	CA not required for voluntary credits
EU	ETS	Emission caps and expensive penalties,carbon tax, and policies such as the European Green Deal	Requires CA in all international trade
South Korea	ETS and offset	Emission caps, market stability provisions, government incentives	CA not required, allows for NCA

Compared to Indonesia, which is still developing its carbon pricing regulatory framework, China's established and stringent regulations have led to a more mature and effective carbon market, demonstrated by successful compliance cycles and the launch of the National Voluntary Market to supplement its compliance market. For international trading regulations, countries with established carbon markets like China, Australia, and Europe can serve as references. These countries have covered multiple sectors and facilitated international trading, providing benchmarks for Indonesia to develop a more effective carbon pricing strategy aligned with global standards.

2.4 Overview of different types of carbon credit projects in Indonesia

This section provides an overview of the various types of carbon credit projects currently being implemented in Indonesia. We will particularly look at the main categorisations relevant to the Indonesian carbon market based on Presidential Regulation No. 98 alignment with sector-specific.

Types of mitigation actions based on NDC sectors in Indonesia

In its strategy to achieve the NDC target, Indonesia has adopted a sector-based approach, allowing for more specific emission reduction targets and approaches. Through the Presidential Regulation No. 98 of 2021, Indonesia currently recognises five sectors: 1) Energy; 2) Waste; 3) Industrial Processes and Product Use ("IPPU"); 4) Agriculture; and 5) Forestry. These sectors are further classified into subsectors and sub-subsectors, which are currently still under development. Furthermore, carbon projects in Indonesia are included in these categories and are regulated by the ministry in charge of the sector. Sectors, subsectors, and sub-sub sectors as of June 2024 are presented in the Table 3.1 below.

Table 2.3 NDC sectors in Indonesia based on Presidential Regulation No. 98 of 2021

Sectors (Presidential Regulation No. 98 of 2021)	**Subsectors**	**Sub-sub sectors**	**Regulation**
Energy	CCS & CCUS*	Not yet released	Regulation of the Minister of Energy and Mineral Resources No. 2 of 2023
	Power generation		Regulation of the Minister of Energy and Mineral Resources No. 16 of 2022
	Transportation		Presidential Regulation No. 98 of 2021
	Construction		
Waste	Garbage		
	Solid waste		
	Liquid waste		
IPPU	Industry		
Agriculture	Rice field		
	Farm		
	Plantation		
Forestry	Forestry	State forest areas not licensed for management rights	Regulation of the Minister of Environment and Forestry No. 7 of 2023
	Peat and mangrove management	Areas allocated for licence/ agreements	
		Areas with management rights	
		Customary forest areas	
		Forests subject to rights	
		State forests that are not forest areas	

**) Carbon capture and storage (CCS) and carbon capture, utilisation and storage (CCUS) is not defined as a subsector in Presidential Regulation No. 98 of 2021. However, it is recognised as activities under the energy sector in the Regulation of the Minister of Energy and Mineral Resources No. 2 of 2023.*

Indonesia has prime resources in terms of nature and renewable energy. Forests play a crucial role in regulating the climate by absorbing CO2. When they are altered from their natural state and left untreated, their natural carbon sink is diminished. The significant potential that forestry projects have in contributing to carbon offsetting and climate change mitigation. Unsurprisingly, forestry becomes one of the main sectors of Indonesia's strategy towards achieving NDC; with energy being the other key sector, as it is the largest contributor to Indonesia's total GHG emissions[15]. As a result, the regulatory framework and methodologies available for carbon projects are primarily focused on these two sectors.

The Enhanced NDC provides a list of potential mitigation actions that can be implemented in Indonesia. Given the costs required to execute these initiatives, the involvement of project developers will be crucial. Therefore further regulations and policies are necessary for the IPPU, agriculture, and waste sectors to reflect progress seen in other sectors. For benchmarking, internationally accepted standards like Verra's methodologies for waste handling, biogas, agroforestry, mangrove restoration, and peatland conservation align with the mitigation actions planned in the enhanced NDC. For example, Verra's methodology includes approved approaches like Waste Handling and Disposal (Methane Recovery in Wastewater Project), Biogas (Hamparan Biogas Project), and Agriculture (Agroforestry and Reforestation for Carbon Sequestration.

Approved carbon credit methodologies

Carbon projects in Indonesia must be registered in the SRN-PPI to be formally acknowledged and claimed for crediting. The registry currently allows methodologies issued by the directorate general, national standardisation bodies, as well as methodologies under the UNFCCC to be registered as carbon projects.

As of June 2024, the registry currently recognises a total of 49 methodologies, not including those under the UNFCCC (Figure 2.1). These methodologies are also classified according to NDC sectors in Indonesia.

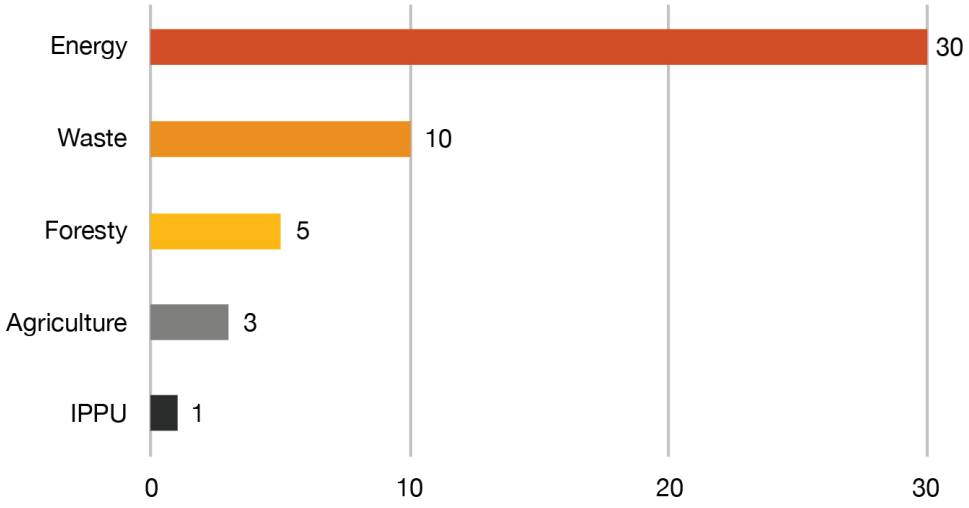


Figure 2.1 The total of accepted methodologies under SRN PPI for each sector of carbon projects
Source: https://srn.menlhk.go.id/index.php?r=metodologi%2Findex

When examining internationally recognised methodologies, such as the Verified Carbon Standard (VCS) by Verra, the Gold Standard, and the Clean Development Mechanism (CDM), it becomes evident that numerous approaches are available for carbon market projects. Indonesia has a unique opportunity to capitalise on the diverse methodologies. By aligning its standards with these internationally recognised methodologies, Indonesia can potentially improve its participation in the global carbon market.

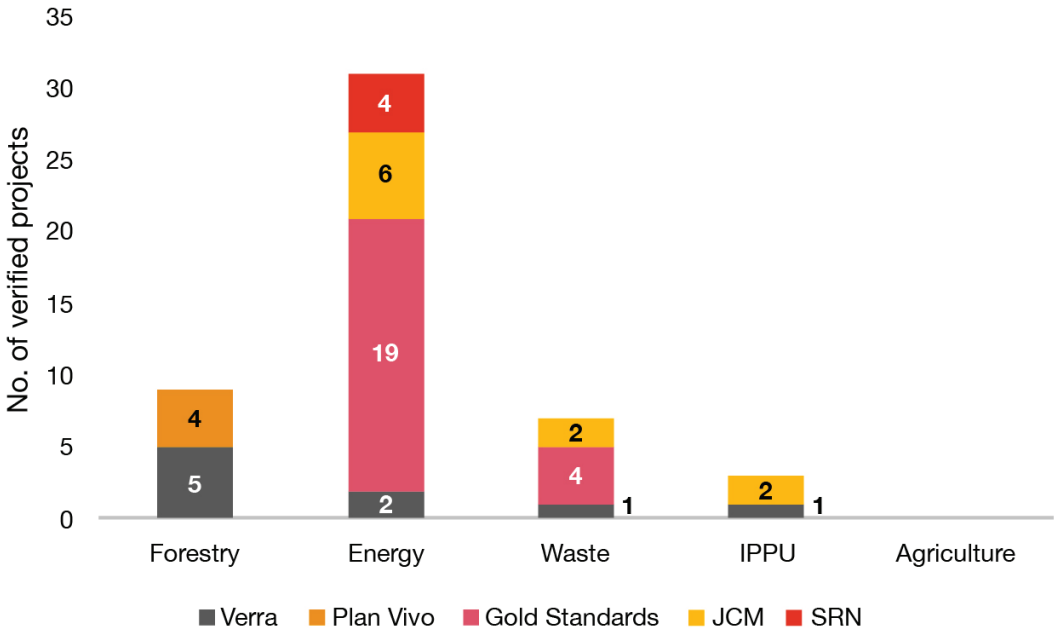


Figure 2.2 Comparison of registered projects in national and international registries as of September 2024.

Currently, SRN PPI provides users with limited access to high-level information. The project website in SRN's database offers a brief overview of each project, including the sector it falls under, its location, the entities responsible, and the amount of emissions reduced. However, this level of detail falls short when compared to international standards, which typically allow users to access comprehensive project development documents and technical details. For instance, international standards typically provide easy access to essential documents such as the Project Design Document (PDD), Monitoring Report, Feasibility Study, and transparency of method within Verification and Validation Reports.

The lack of transparency in SRN PPI's current approach can hinder stakeholders' ability to fully understand the project's scope, implementation strategies, and overall impact. This can lead to reduced trust and engagement from the public and potential investors, as they may find it challenging to assess the project's credibility and effectiveness without detailed information.

To address these challenges and enhance the effectiveness of Indonesia's carbon credit market, it is essential to develop robust infrastructure. This includes implementing effective Monitoring, Reporting, and Verification (MRV) systems, providing comprehensive buyer education, and fostering active investor engagement. By improving these areas, Indonesia can build greater stakeholder confidence and gain international recognition. For instance, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) mandates a registry and methodology to ensure credibility, setting a benchmark that Indonesia could follow to strengthen its carbon market.

Carbon projects post national carbon credit regulation (SRN PPI)

After the enactment of Presidential Regulation No. 98 of 2021, carbon projects must be registered in the centralised SRN-PPI registry for accurate, transparent, and public data. Project proponents follow four steps: 1) Registration; 2) Completing general project information; 3) Completing technical project information; and 4) Emission reduction verification. After these steps, they can apply for SRN PPI issuance to the Directorate General of Climate Change Mitigation or *Direktorat Jenderal Pengenendalian Perubahan Iklim* (DJPPI).

SRN PPI classifies projects into several categories[16]:

- **Recorded projects:** Completed steps 1 and 2 (12,985 proposals).
- **Registered projects:** Completed step 3 (261 projects).
- **Verified projects:** Completed step 4 (75 projects as of June 2024).

The SRN PPI's SPE database indicates that four projects have historically been issued SPE-GRK (Figure 2.3), with only two currently listed on IDXCarbon. The energy sector is the most prominent among these issued projects, accounting for all three SRN PPI issuances in this sector. Most registered and verified projects are managed by regional governments or ministries, with only a few owned by public companies.

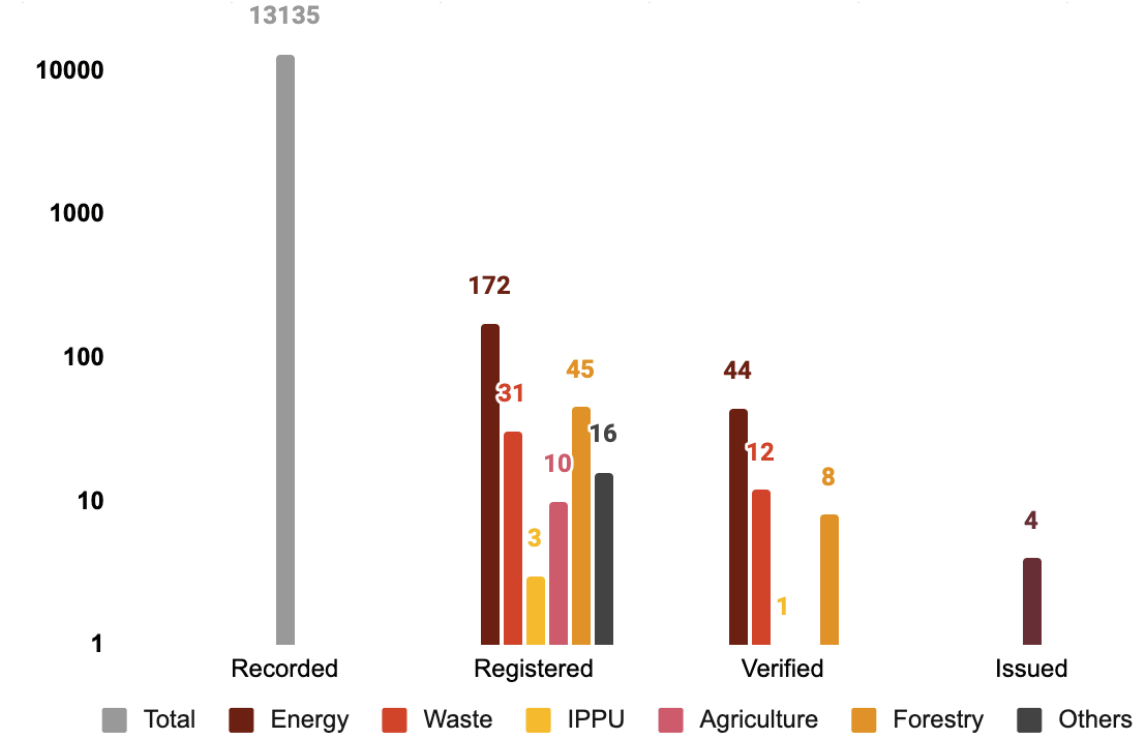


Figure 2.3 The number of carbon projects under the SRN PPI registry as of 30 June 2024
**) The recorded proposals have not been assigned to any sector, thus is shown as the total number of all proposals.*

3 Market mechanisms and standards

3.1 Overview of Indonesian carbon market schemes

Indonesia has two carbon market mechanisms: **compliance-based through emission trading and voluntary-based carbon market through offsetting**[17]. In relation to the compliance-based market, Indonesia is still in the early stage of developing such a market, yet it has made significant progress in recent months. The overview of the carbon market schemes are provided in Table 3.1.

Table 3.1 Comparison between carbon market mechanisms

Key Items	Emissions Trading	Emissions Offsetting
System	Emission Trading System (ETS)	Carbon crediting/offsetting
Market	Compliance Market	Voluntary Credit Market (VCM)
Method	Cap and trade (and tax)	Baseline and crediting
Mechanism	Carbon unit buyers whose business activities exceed the emission allotment/quota (emission quota deficit) purchase quota/capacity to emit more emissions from carbon unit sellers who have a surplus of carbon emission quota/ capacity.	Carbon credit buyers who wish to emit carbon emissions from their business activities purchase carbon credits to offset(-ting) GHG emissions released as a result of their activities from the carbon credit sellers.
Carbon unit	Carbon Allowance Approval (Persetujuan Teknis Batas Atas Emisi "PTBAE")	Emissions Reduction Certificate (Sertifikat Pengurangan Emisi Gas Rumah Kaca" SPE-GRK")
Sector and Sub-sector	• Energy (Power Plant) • Forestry (Peat and Mangrove Management)*	• Energy (Carbon Capture and Storage (CCS) and Carbon Capture, Utilisation and Storage (CCUS)) • Forestry (Forestry)

**The carbon allowance for Forestry sub sector Peat and Mangrove Management is still in the preparation and development phase by the Ministry of Forestry and Environment Forestry (MoEF).*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For this purpose, the Government Indonesia, led by Ministry of Environment and Forestry (MoEF), adopts three pronged approach for carbon credit issuance: (1) the Measurement, Reporting, Verification (MRV); (2) the National Registry System for Climate Change Control (Sistem Registrasi Nasional Pengendalian Perubahan Iklim/SRN PPI); and (3) the GHG emission reduction certification (SPE GRK)[15].

First, as the implementation of a compliance-based carbon market, Indonesia just inaugurated its own carbon exchange,IDX Carbon on 26 September 2023 as the trading platform of the Indonesian carbon market. As previously mentioned in Chapter 2 of this paper, IDX Carbon serves as the facilitator of the buying and selling of carbon units. The trading system developed by IDX Carbon aimsto ensure that companies in certain regulated industries have their individual emission capped as total emission in their respective industries are also capped.

Within the IDX Carbon system, there are four types of carbon trading mechanisms. The first mechanism is auction, whereby prospective buyers engage into this system by submitting purchase requests and detailing the volume they seek together with the offering price. Through regulators/ project developers, the bidded carbon units are then offered to the highest bidders. The second mechanism is regular trading, which operates through a continuous auction framework where all parties can submit their buy and sell offers. The third mechanism, negotiated trading, is offered by IDX Carbon itself for the trades that have been pre-negotiated outside the system. The fourth mechanism is the marketplace, which serves as a dedicated market space where emission mitigation project owners can offer their carbon units at predetermined prices and grant them greater control over their sales strategy.

Under Article 26 of Law No. 4 of 2023 on the Development and Strengthening of the Financial Sector, carbon units as the trading object of IDX Carbon constitute securities (efek). Though it is titled as Securities (efek) by virtue of Law, theirnature does not represent the conventional securities in the capital market. Carbon unit as Securities is treated more like intangible assets as per the Indonesian Civil Code definition. Regarding this, the OJK Regulation No. 14 of 2023 on Carbon Exchange followed by IDX Regulations for its implementation, specifies the tradable units and the market mechanisms, as described below.

Carbon Market Types in IDX Carbon	The Tradable Carbon Units in IDX Carbon
• Carbon unit trading on the IDX can only be conducted by and between IDX Carbon users • Carbon Units must be registered in SRN PPI and IDX Carbon • The unit trading volume is a multiple of one or one tonne of CO2e • There are four types of markets on IDX Carbon, namely: (i) auction markets (ii) regular markets (iii) negotiated markets and (iv) non-regular markets Various trading factors (e.g., the subject and the object of trading) will vary depending on the types of markets on which trading takes place.	Carbon Units in the form of: 1. PTBAE-PU stipulated by the sectoral ministries; and 2. SPE-GRK (issued by SRN PPI) International verified carbon units (VCU) unregistered in SRN PPI can be traded by and in the IDX Carbon, provided that: 1. Registered, validated and verification by institution accredited by international registration system operator; 2. Fulfil the trading requirement by foreign Carbon Exchange; and 3. Other requirement as stipulated by OJK

Figure 3.1 Carbon market types and tradable carbon units in IDXCarbon
Sources: Indonesia's Carbon Pricing (2023), PwC Indonesia

Every carbon unit transacted in the carbon exchange must be recorded in the SRN PPI and by the carbon exchange operator. The OJK Regulation also allows the operator to facilitate the trading of carbon units from foreign countries listed in the SRN PPI or carbon units not listed in the SRN PPI, subject to certain conditions. Though the OJK Regulation seems to open up opportunities for foreign ERCs to be traded in IDX Carbon, this provision is subject to further implementing regulation to be discussed with MoEF and it needs to be read that each carbon credit must be registered in SRN PPI. Thus, the application of this provision on foreign ERCs will be subject to the implementing regulation on the Mutual Recognition mechanism.

Second, prior to the compliance-based market, Indonesia has been familiar with the voluntary-based carbon market or notably known as VCM. In principle, VCMs is a type of carbon market which organises voluntary purchase credits from projects that (i) prevent emissions, (ii) reduce emissions, or (iii) permanently remove emissions from the atmosphere to offset some or all of their own carbon emissions. Standard setters will verify these kinds of projects by using different methods before the issuance of carbon offset credits as the issued products.

Both compliance and con-compliance carbon markets exist, but both are still developing. The Compliance market, regulated by the government, includes mechanisms like cap-and-trade and carbon taxes to meet national emission reduction targets. The Non-Compliance market operates voluntarily, allowing businesses and individuals to purchase carbon credits to offset emissions beyond regulatory requirements.

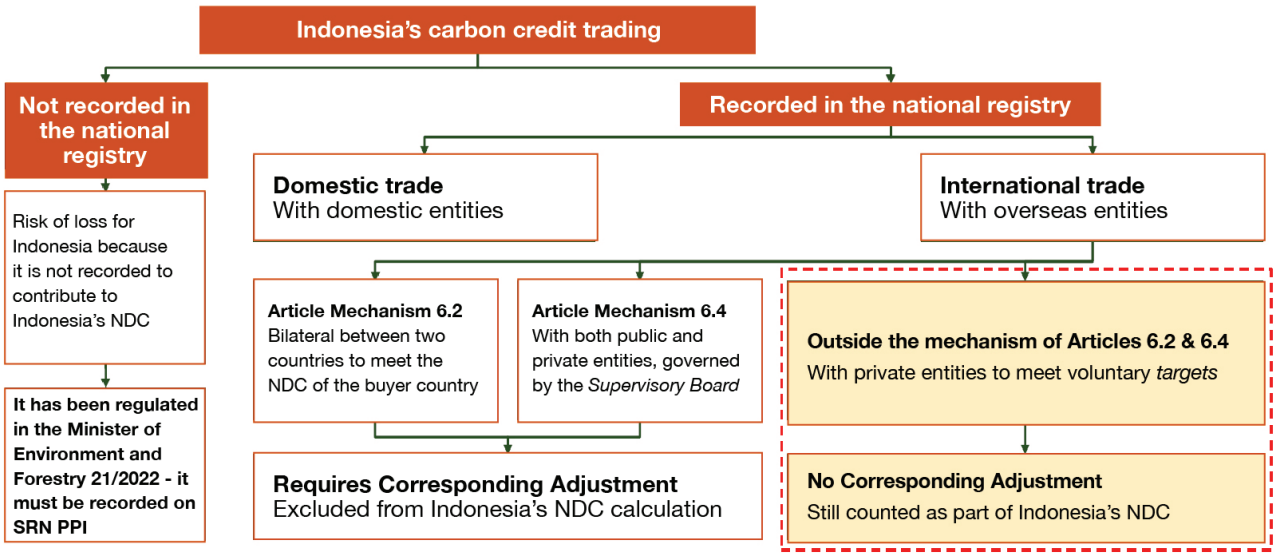


Figure 3.2 Indonesia's international carbon trading scheme. The items boxed in red dotted lines are mechanisms currently not yet fully implemented in Indonesia.
Source: Coordinating Ministry for Maritime Affairs and Investment Republic of Indonesia

The overview of the carbon trading mechanisms in Indonesia is provided in Figure 3.2. One of the uncertainties surrounding the domestic carbon market arises due to the concept of Corresponding Adjustment (CA), which was introduced in Article 6 of the Paris Agreement. Simply put, corresponding adjustment refers to the mechanism in which carbon credits sold from one country to another are properly accounted for through authorization and reporting processes so that no double counting of emission reduction occurs. In contrast, Non-Corresponding Adjustment (NCA) occurs when carbon credits are transferred without accounting adjustments.

International carbon trading that was performed without CA will still count towards Indonesia's NDC. Foreign companies can claim voluntary emission reductions using Indonesian carbon credits traded without CA, noting that under the Paris Agreement, emission reductions are recorded in the project's country of origin (Indonesia). However, these mechanisms are still in development and not fully implemented in Indonesia. The uncertainties surrounding these CA/NCA mechanisms are causing doubts among foreign investors and limiting the participation from international entities to take part in the domestic market.

3.2 Current market dynamics and future potential

As of September 2024, the carbon market transaction volume has reached IDR 37.1 billion (equivalent to 2.4 million USD) with a carbon dioxide trading volume of 613,894 tonnes since it opened on September 26, 2023. This number is relatively small compared to other countries with a more developed carbon market. Australia is an example of a mature and larger carbon market in scale, with 17.2 million tonnes of new ACCUs issued and a market demand of 3.7 million tonnes of ACCUs in 2023[18]. China's National ETS market serves as another example. From January 1, 2022 to December 31, 2023, the trading volume was 263 million tonnes, with a transaction value of 17.26 billion yuan (equivalent to 2.4 billion USD)[19]. All of these figures indicate that the Indonesian market is still in the preliminary stage in comparison to other countries with an established carbon market. Therefore, Indonesia's carbon market can learn from the mechanisms and regulatory drivers from these other countries as benchmarks to develop its market maturity.

Looking at Indonesia's potential, its vast natural resources provide significant potential for nature-based solutions, making the country a pivotal player in the carbon market. Indonesia is the third largest tropical rainforest in the world, covering 125.9 million hectares and capable of absorbing 25.18 billion tonnes of CO2[20]. Indonesia's mangrove forests, spanning 3.31 million hectares, can absorb around 950 tonnes of carbon per hectare, totaling 33 billion tonnes of carbon[21]. Moreover, Indonesia has the largest peatland in the world, covering 7.5 million hectares with a carbon absorption capacity of approximately 55 billion tonnes[22]. In total, Indonesia has the potential to absorb 113.18 gigatons of CO2, highlighting its potential role in global carbon sequestration efforts.

From the renewable energy sector, Indonesia holds a maximum potential of 3,687 GW of energy from ocean wave, geothermal, bioenergy, wind, hydro, and solar[23]. For perspective, this amount is equal to 112x Indonesia's total electricity consumption for the year 2023 of 288.4 TWh[24]. Considering PLN's current electricity generation emission factor of 852 gCO2/KWh, Indonesia's renewable energy potential is equivalent to 27.5 GtCO2e per annum of potential emission reduction. Furthermore, Indonesia's geology also supports a high potential for CCS storage, with an estimated value of 577 GtCO2e in saline aquifers and depleted oil and gas reserves[25]. While it is impossible to completely harness these potentials in practice, these figures show the significant potential of carbon credits to be generated from carbon projects in Indonesia.

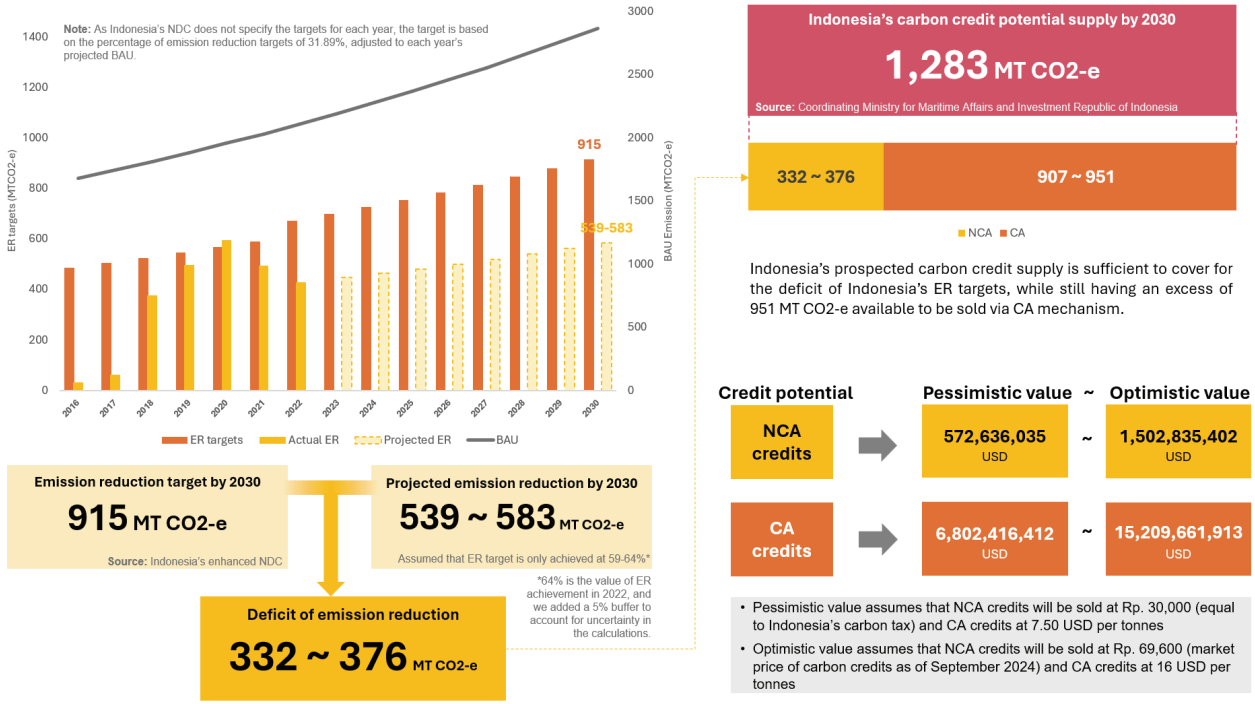


Figure 2.4 The overview of Indonesia's carbon market potential

Indonesia's carbon market is projected to generate 1,283,000,000 units of carbon credits by 2030. If we assume that the annual emission reduction target growth is linear until 2030, Indonesia has only achieved 64% of its emission reduction target (estimated: 674 MT CO2-e) in the year 2022. Assuming that this percentage stays at a similar rate of 59-64% until 2030, the future carbon market can cover for the deficit of emission reductions through the diverse carbon projects potential to be developed in Indonesia, which amounted to 332-376 MT CO2-e. After being deducted by that value, as much as 908-951 million units of carbon credits will still remain and will be available for sale through the corresponding adjustment (CA) mechanism. In total, the carbon market in Indonesia can generate between 0.6 billion and 1.5 billion USD in revenue from the non-corresponding adjustment (NCA) and an additional 6.8 billion to 15.2 billion USD from the corresponding adjustment (CA). These values were obtained assuming that the carbon credits will be sold at Rp. 30,000-Rp.69,600 per tonnes for NCA and 7.5 USD - 16 USD per tonnes for CA. This entire explanation is depicted in Figure 2.2.

Looking ahead, the global demand for carbon credits is projected to reach 1.6 gigatons of CO2e annually by 2030[26], according to the Taskforce on Scaling Voluntary Carbon Markets. Additionally, the International Energy Agency (IEA) estimates that the carbon credit market could grow significantly, driven by increasing climate commitments and the need for emission reductions[27]. This growing demand opens up the opportunity for Indonesia to take up a major role in the global carbon market.

4 Opportunities, Challenges and Key Takeaways

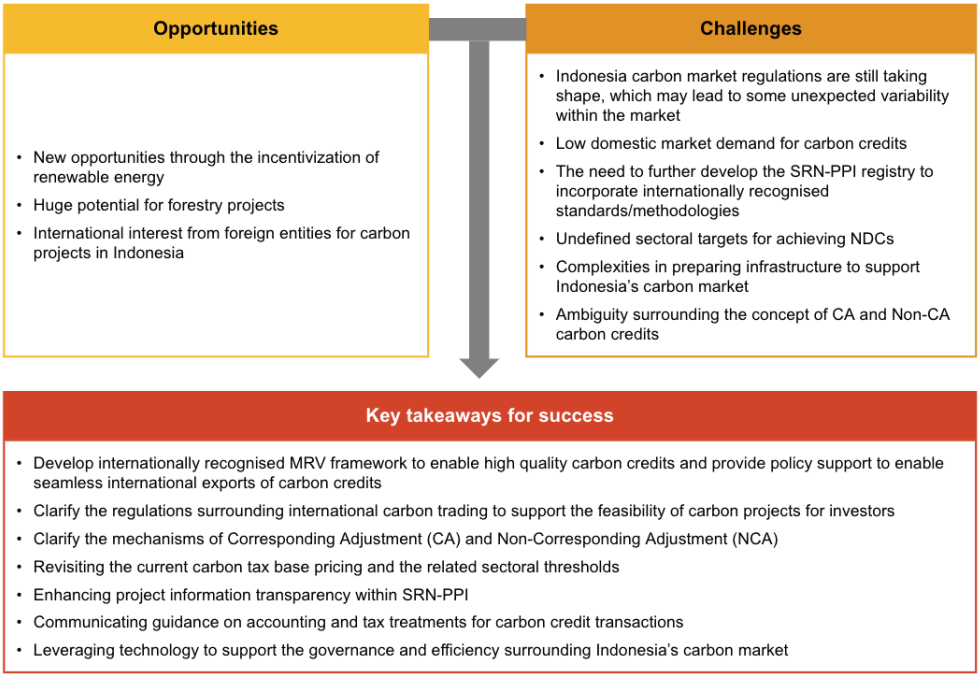


Figure 4.1 The overview of the opportunities, challenges, and key takeaways for success of Indonesia's carbon market

Indonesia is poised to become a significant player in the carbon market in the medium to long term. The country offers substantial potential for investors, attracted by high returns that offset project costs and a developing policy environment[28]. As the market grows, project developers find opportunities in the increasing demand for sustainable solutions. Their role is crucial and should be supported by both individual nations and collective entities within the UNFCCC.

Establishing a mature carbon market infrastructure, including transparent registries and internationally recognised methodology, is crucial to attracting and retaining investors. For instance, Indonesia's recent efforts to open its carbon market to international investors and the establishment of the OJK to oversee carbon trading are positive steps[29]. Enhancing collaboration between state and non-state actors, through initiatives like IDCTA's public discussions with key carbon market players, can improve climate initiatives and promote a more inclusive approach to tackling climate change.

In line with these efforts, Indonesia is in the process of laying the groundwork for its carbon market infrastructure. The need for preparedness is underscored by the possibility of project developers considering other countries that might offer more conducive environments. If the challenges are not addressed in a timely manner, Indonesia might find itself not keeping pace with other nations in the global carbon market, such as Singapore and Thailand, which have more established carbon pricing policies and Emission Trading Systems (ETS)[30]. Hence, strengthening the infrastructure and streamlining regulations on the carbon market, will not only maintain the interest of current project developers but also attract new ones, thereby fostering the growth and sustainability of the carbon market in Indonesia.

4.1 Opportunities for market growth and expansion

New opportunities through the incentivisation of renewable energy

To meet its high energy demand, Indonesia relies heavily on coal and crude oil, with coal accounting for 42% and crude oil for 32% of the country's energy generation[31]. This heavy dependence on fossil fuels results in significant GHG emissions, making the energy sector the largest contributor to Indonesia's total GHG emissions[32].

Indonesia benefits from its geographical, geological, and natural resource characteristics, which possesses substantial potential for renewable and clean energy generation. The latest estimate puts this potential at 3,687 GW of energy from various sources (Table 3.3), with the main potential being solar power due to Indonesia's vast territory and position in the tropics. However, as per 2023, only 0.3% of this potential has been utilised[33].

Table 4.1 Indonesia's potential and realisation of renewable energy generation

Source	Estimated Potential (GW)	Realisation in 2023 (GW)	Percentage of Realisation (%)
(Ocean) Wave	63	0	0
Geothermal	23	3.4	10.3
Bioenergy	57	0.2	5.4
Wind	155	6.7	0.1
Hydro	95	0.3	7
Solar	3294	12.7	0.01
Total	**3.687**	**12.6**	**0.3**

Sources: Dewan Energi Nasional. (2024). Indonesia Energy Outlook 2023.

The implementation of renewable generation in Indonesia is currently facing technological and funding challenges, preventing Indonesia from fully utilising these cleaner energy sources. However, the presence of a national carbon market can synergise with this potential in a mutually beneficial relationship. By converting these previously untapped potentials into monetary values through the carbon market mechanism, it not only provides financial incentives, but also encourages the adoption of cleaner renewable energy. This system can help reduce greenhouse gas emissions, promote sustainable development, and support Indonesia's transition to a low-carbon economy.

Huge potential for forestry projects

Indonesia's large territory and vast historical coverage of rainforest, Indonesia's forestry sector holds a huge potential for carbon projects to be implemented. Indonesia has the highest potential among other ASEAN countries for protecting high-quality natural forests and mangroves. This key investment strategy preserves significant carbon stocks in these forests, contributing US$10.1 billion annually[34]. A journal article published in 2022 estimated that reforestation alone could enable Indonesia to reduce as much as 247 million tonnes of CO2e per year[35]. Another estimate puts the total potential market value of Indonesia's whole forestry sector to be around IDR 8,000 trillion (with an assumption of carbon price of USD5/ton CO2e)[36], considering the maximum sequestration potential of rainforests and mangroves of Indonesia. This high potential of the sector is also reflected in Indonesia's Enhanced NDC targets which includes an ambitious sectoral emission reduction target of up to 729 million tonnes of CO2e by 2030[37].

International interest from foreign entities for carbon projects in Indonesia

Due to Indonesia's enormous carbon capture storage (CCS) and natural resources potential, foreign entities have historically shown interest in financing carbon projects in the country. Larger-scale projects have often involved funding and collaboration with international entities, both at the national level, such as REDD+ agreement with Norway[38], and at the project level, such as BP's CCS project called Tangguh project, which has a storage capacity of 1.8 gigatons of CO2[39]. More recently, foreign investors, including Abu Dhabi's Offset8 Capital, have invested in biochar projects in Indonesia[40]. These investments not only contribute to environmental sustainability but also offer financial returns. The growing global emphasis on reducing carbon emissions and the increasing demand for carbon credits further enhance the attractiveness of this market.

International demand is also expected to grow with the need of CORSIA approved carbon credit to meet the offset requirements by the airline industry. CORISA which will become mandatory in 2027 will be applicable for most airlines across the globe. As of 2023 there is only one CORSIA approved carbon project which is the Guyana project which is able to produce an estimated 7.14 million tonnes worth of credit. Despite the potential of the project itself, it is still minor in comparison to what the airline industry will need in the future with an estimated number of 100 million tonnes annually. This provides a market growth potential if the Indonesia Registry is able to meet the CORSIA standard.

Moreover, government incentives and international partnerships can provide additional security and profitability for investors. As Indonesia continues to develop its carbon market infrastructure, early investors stand to gain from the anticipated growth and maturation of this sector. The Indonesian government is currently seeking to increase participation from foreign investments, for example through the allowance of cross-border CCS projects. Exploring other means for foreign investors to participate in the national market is crucial for driving long-term growth. Initiatives such as establishing sustainable financing frameworks, creating public-private partnerships, and offering tax breaks for sustainable projects can further incentivise investment. Together, these measures can create a more attractive and dynamic investment environment, stimulating growth and ensuring the long-term sustainability of Indonesia's carbon market.

4.2 Key challenges faced by the Indonesian carbon credit market

Indonesia carbon market regulations are still taking shape, which may lead to some unexpected variability within the market

The regulatory landscape for Indonesia's carbon market is still in its formative stages, having only opened in September 2023. The government has introduced several key regulations, such as Perpres 98 Tahun 2021 on the Carbon Pricing Mechanism, which aims to establish a foundational framework for carbon pricing and trading. However, these regulatory frameworks are still evolving.

The government's role in shaping Indonesia's carbon market landscape is crucial, particularly in establishing carbon trading platforms, implementing cap-and-trade systems, and introducing carbon taxes. These regulatory initiatives are key drivers in the development of Indonesia's carbon market. However, further changes are still expected, and there are still many upcoming developments on how regulations might evolve to adapt to the ever-changing market dynamics. This poses additional considerations for project proponents aspiring to participate in the carbon market. For example, as of September 2024, the regulatory frameworks for several sectors, including Waste, Agriculture, and IPPU, are still under development and have yet to be fully defined. This evolving regulatory environment makes it challenging for prospective project proponents to plan and conduct carbon projects in these specific sectors.

There is a pressing need for more detailed and standardised guidelines to promote consistency and transparency in carbon credit reporting across all sectors. The current regulatory environment faces challenges, such as developing comprehensive regulations for tax, accounting, redemption processes, and preventing double counting. These gaps can complicate financial planning, which may cast doubts within investors and potentially deter investment in Indonesia's carbon market.

Low domestic market demand for carbon credits

From the perspective of business and project developers, the current carbon credit price is insufficient to make projects financially viable. As of September 2024, the market price of carbon credits is IDR 58,800 per tonne (approximately USD 3.8). In comparison, the estimated costs for reducing emission from afforestation projects is estimated to range from USD 35 to USD 65 per tonnes of CO_2[41]. Technology-based mitigation actions are even more expensive, with costs ranging from USD 15 to USD 120 per tonnes of CO_2[42]. These figures showcase the difficulties for project developers to sustain carbon projects from a financial standpoint.

The low price of carbon credits in Indonesia highlights a significant problem within the carbon market. The absence of market demand for these credits, which keeps their prices down. This imbalance makes it difficult for project developers to cover their costs, which include opportunity costs, implementation costs, transaction costs, and institutional costs. Addressing these financial challenges requires stronger policy interventions, such as carbon floor prices, subsidies, or incentives, to boost the carbon credit market. Without addressing these challenges, the financial feasibility of carbon projects remains uncertain which can potentially hinder progress towards emission reduction targets.

One way the market demand can be stimulated is through the implementation of effective carbon tax and emission capping mechanisms. In January 2023, the government implemented the cap-and-trade mechanism in a limited scope through PTBAE for 99 coal-fired power plants throughout the country. The scope of implementation is planned to be expanded through three distinct phases until 2030 to include other categories of power plants as well. However, the effectiveness of these platforms depends on the expansion of cap-and-trade systems and a sufficient supply of carbon credits to establish them as a viable commodity in the carbon market. Looking at China's carbon market, the partial allowance of voluntary carbon credits to cover emission excesses in the emission cap may also be a significant driving force for the voluntary carbon market. This example highlights

how regulatory measures and market mechanisms can drive the market demand for carbon credits, which ultimately drives the national carbon market[43].

Although Indonesia plans to implement a carbon tax in 2025, the proposed base price of IDR 30,000 (approximately USD2 per ton)[44] is considered too low compared to the global average. For context, the global average carbon tax price is around USD 6 per ton, with some regions, like the European Union, pricing carbon as high as USD90 per ton[45]. Critics argue that this low value may not effectively drive decarbonisation efforts or stimulate the market supply for carbon credits. Additionally, the emission cap will need to be carefully considered and adjusted to adequately drive market demand for carbon credits. Therefore, the carbon tax price should ideally be higher than the market price of carbon credits to effectively incentivise reductions in emissions and drive market demand. Singapore's carbon tax, implemented in 2019, has been a notable success and serves as a model for other countries. Singapore introduced its carbon tax at SGD5 per ton of CO2e from 2019 to 2023, covering about 80% of its greenhouse gas emissions. To support its net zero targets, Singapore has increased the carbon tax to SGD25 per ton for 2024 and 2025 and plans to further increase to SGD45 per ton in 2026 and 2027. By 2030, the tax is expected to reach between SGD50 and SGD80 per ton[46].

Overall, government-driven initiatives like cap-and-trade systems and carbon taxes are the key factor in stimulating the demand for carbon credits in the carbon market. These systems set a cap on emissions and allow companies to trade permits, creating a financial incentive to reduce emissions.

The need to further improve the SRN PPI registry to incorporate internationally recognised standards/methodologies

Indonesia is in support of the international public registry and transactions, shown by the establishment of the SRN PPI system. The activity information for each project is already accessible to the public. However, the information contained is very limited, especially when compared to international registries. The information only contains title, objectives, administrative information, type and sector of the project, and the achieved/verified emission reduction. There are no publicly disclosed documents that significantly enhance the transparency of the carbon projects registered under SRN PPI which will provide additional comfort towards wider stakeholders.

It's crucial that the SRN can verify carbon projects to a high, internationally acceptable standard. Investors will need to see more examples of internationally verified projects also being validated by the SRN, similar to the success of the Rimba Raya project, which was the first REDD+ carbon project validated by the SRN. This demonstrates the SRN's capability to validate projects that meet rigorous international criteria. To achieve this, the SRN still needs to address several issues such as the quality of the MRV, data accuracy of Sistem Inventarisasi Gas Rumah Kaca Nasional (SIGN-SMART), and transparency throughout the whole process. Additionally, enhancing the existing SRN PPI registry system by implementing advanced technologies such as, blockchain for transparent data recording and real-time data analytics, can ensure accurate tracking and verification of carbon credits. By addressing any existing technology issues with these innovations, the system can become more reliable and efficient, thereby maintaining high standards of credibility and trust in the carbon market.

Addressing these issues is essential for the SRN to align with international carbon registries. These registries accommodate internationally recognised methodologies by adhering to rigorous protocols and standards. Moreover, these registries often incorporate third-party verification processes to maintain the integrity of the credits. Independent auditors assess projects against the established methodologies to ensure compliance and accuracy. These methodologies ensure that carbon credits are credible, verifiable, and meet global benchmarks. For instance, Verra and GS methodologies that align with the Greenhouse Gas Protocol and ISO standards, which are widely accepted in the carbon market. This alignment, be it Indonesia wanting to just adopt some approach from these standards and at the end develop their own, or fully align with them, provides confidence to both developers and buyers that the carbon credits generated are legitimate and contribute to real emission reductions.

Undefined sectoral targets for achieving NDCs

Indonesia needs to enhance its capacity for transparency and data management to effectively monitor and report progress. Perpres 98 Tahun 2021 states that the implementation efforts towards achieving the NDC targets should be outlined in a roadmap document with sections explaining the NDC's baseline & targets, mitigation and adaptation scenarios as well as funding, technology and capacity building. This document should explore each sector in detail, along with any implementation plans to start working towards it.

The clarity will provide project developers to properly analyse their project feasibility as it would minimise the risk of potential carbon credit classification (CA or NCA) that will be generated and their permissible area prior to their investment decision to mitigate any potential conflict with the other NDC's initiatives.

Complexities in preparing infrastructure to support Indonesia's carbon market

The readiness of infrastructure in Indonesia's carbon credit market is crucial for its successful implementation. Before opening up the market, several preparations are necessary, particularly in ensuring supply side readiness, demand side readiness, and regulation readiness.

On the supply side, establishing robust monitoring, reporting, and verification (MRV) systems is essential to accurately track carbon emissions and reductions. This includes investing in advanced technologies such as satellite imaging, blockchain for transparent data recording, and real-time monitoring. Comprehensive training programs for personnel are also necessary to enhance their skills in data collection and analysis, ensuring accuracy and reliability.

On the demand side, creating awareness and educating potential buyers about the benefits and mechanisms of carbon credits is vital. This involves not only highlighting the environmental advantages but also explaining how carbon credits work in practice. Potential buyers need to understand the process of purchasing and utilising these credits, as well as the long-term economic and reputational benefits they can gain. Effective education campaigns can demystify the concept, making it more accessible and appealing to businesses and individuals alike, ultimately driving greater participation in carbon offset programs.

Moreover, investors with financial resources, both local and foreign, also have the potential to stabilise the market by injecting capital and expanding the market's reach via their respective networks. This capital injection helps in expanding the market's reach and establishing a more predictable ecosystem, while also offering the necessary liquidity and risk management tools. For example, in the EU, the European Investment Bank (EIB) provides financial support for climate projects and aids the EU ETS. Its involvement has led to the development of the EIB Climate Bank Roadmap and the sponsoring of carbon projects, which has helped activate the carbon market in the EU.

Moreover, to enhance investor confidence and ensure the integrity and transparency of carbon credits, it is beneficial to address and resolve any technology issues within the registry system. Implementing advanced technologies for accurate tracking of credits and streamlining the issuance process can significantly improve the system's reliability. For instance, Jordan was the first developing country to build MRV and GHG Registry systems to international standard utilising blockchain technology to ensure transparency and accurate tracking of emissions reductions, to support their carbon markets[47]. By focusing on these improvements, the registry can maintain high standards of credibility and trust, which are crucial for the growth and stability of the carbon market.

Ambiguity surrounding the concept of CA and Non-CA carbon credits

Indonesia has issued key regulations such as Presidential Regulation No. 98/2021 and MoEF Regulation No. 21/2022 which established the legal framework for carbon pricing and trading to meet the country's emission reduction targets. While these regulations mark significant progress, there is a lack of understanding over its interpretation such as the understanding that all carbon

credits issued in Indonesia will need to be traded domestically and limitation towards international trading due to the misconception that all credits sold to the international market will not be counted towards Indonesia NDC. The main concept that a carbon credit can be classified as a corresponding adjusted or non corresponding adjusted credit is not clear and not fully understood by the stakeholders involved in the carbon market.

4.3 Key Takeaways

1. **Develop an internationally recognised MRV framework to enable high-quality carbon credits and provide policy support for seamless international exports of carbon credits.** Globally, the primary concern for investors in carbon projects is the lack of accountability and effectiveness, leading to diminished confidence among investors and buyers. This issue is particularly relevant in Indonesia, where technical documentation and MRV processes are still in their early stages. To address this issue, it is critical to improve the MRV system and enhance project transparency as well as credibility. A collaboration with internationally experienced and qualified verifiers could be considered to get insights into the necessary improvement actions needed. These measures can build trust among investors and drive the market forward.

   The methodology for carbon projects in Indonesia should align with internationally accepted standards to attract global markets. However, with the current global market view towards carbon projects, Indonesia should not not only adopt but also enhance these methodologies to gain international recognition and build trust in Indonesian carbon credits.

2. **Clarify the regulations surrounding international carbon trading to support the feasibility of carbon projects for investors.** The regulatory landscape in Indonesia is still evolving. Key regulations such as the Ministry of Environment and Forestry Regulation No. 21 of 2022 and Presidential Regulation No. 98 of 2021 established the foundation for carbon pricing and cap-and-trade schemes. However, the absence of detailed interpretation and guidelines, particularly for international trading, creates uncertainty and complicates financial planning for investors. Clarifying Indonesia's position on international carbon trading in the regulations is essential to attract investments in Indonesia's carbon market. Opening the market to international demand will increase the carbon pricing and make the projects feasible for investors.

3. **Clarify the mechanisms of Corresponding Adjustment (CA) and Non-Corresponding Adjustment (NCA).** The mechanisms are critical for achieving Indonesia's Nationally Determined Contributions (NDCs). CA involves accounting adjustments to prevent double-counting of carbon credits between countries. When carbon credits are transferred internationally with CA, the emission reductions are not accounted for by the host country's NDC but are counted towards the acquiring country's NDC. Conversely, when carbon credits are transferred through the NCA mechanism, the emission reductions are still accounted for by the host country's NDCs, in this case, Indonesia. However, the uncertainties surrounding the CA and NCA mechanisms in Indonesia's carbon market are causing doubts among foreign investors and limiting international participation. Indonesia needs to address this uncertainty and clarify these mechanisms in the Indonesian carbon market to allow investors better project potential outcomes. Incentives, such as fiscal benefits, might be considered for projects classified as NCA.

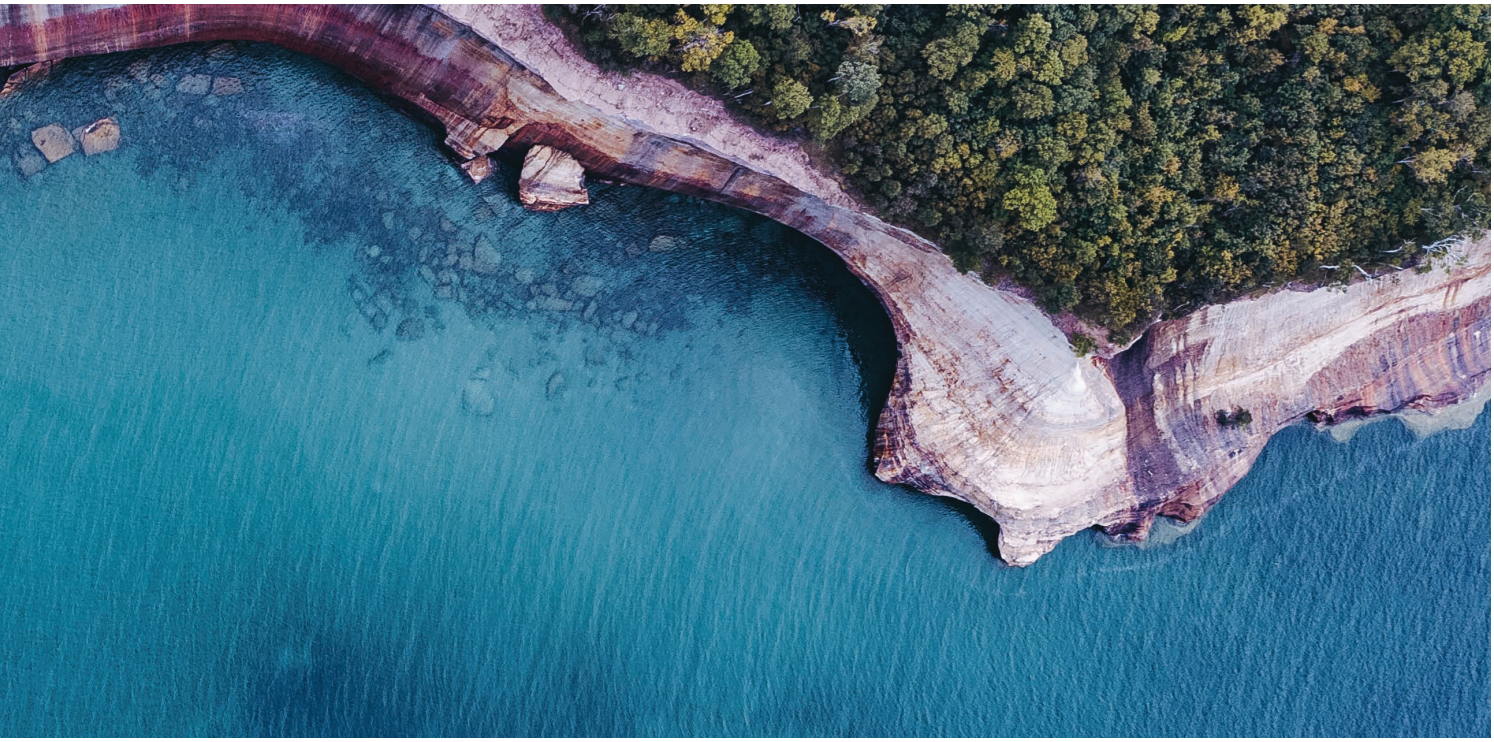
   Regular monitoring of the NDCs achievement is necessary to determine the CA or NCA classification of a project upon registration, ensuring the balance between national and market needs.

4. **Revisit the current carbon tax base pricing and the related sectoral thresholds.** The current stagnation in the carbon market is primarily due to a lack of domestic demand for carbon credits and a clear carbon market mechanism. To address this challenge, the government should proactively implement additional incentives to drive market growth. Firstly, a cap-and-trade system can incentivise companies to reduce emissions by allowing them to trade carbon credits. Currently, the cap-and-trade mechanism covers only coal-fired power plants and has a relatively high threshold. To improve demand, Indonesia could adjust the threshold to a more ambitious level and implement the cap-and-trade mechanism to other sectors.

   Secondly, the implementation of a well-calibrated carbon tax is a powerful driver for carbon credit demand. However, the proposed base price for the carbon market in Indonesia needs adjustment to align with global standards. Ideally, the carbon tax rate should exceed prevailing market prices for carbon credits, creating demand for more affordable carbon pricing through carbon credits purchases. This would encourage companies to purchase carbon credits and invest in emission reduction measures.

5. **Enhance project information transparency within SRN-PPI.** Currently, the SRN PPI provides limited access to high-level information, which falls short of current international registries that offer comprehensive project details, including Project Design Documents (PDDs), Monitoring Reports, and Feasibility Studies. This lack of transparency can impede stakeholders' ability to fully understand project scopes, implementation strategies, and overall impacts. To address these challenges, Indonesia should enhance transparency by aligning with or surpassing the information availability of international registries. This measure will build greater stakeholder confidence, attract international investors, and promote the long-term sustainability of its carbon market.

6. **Communicate guidance on accounting and tax treatments for carbon credit transactions.** Clear guidance for tax treatment in the carbon market is essential for project developers, buyers and sellers to understand the tax implications surrounding their carbon trading transactions. The ecosystem needs a clear overall financial implication resulting from their carbon projects and or carbon trading transactions, including the tax amount, which is usually considered a significant



factor to investors, buyers and sellers. Comprehensive guidelines will standardise practices across sectors, ensuring consistent and accurate measurement and reporting. This will improve market participants' understanding and ability to navigate related instruments. Similarly, the accounting treatment needs continuous socialisations to get a uniform understanding among the key players in our carbon market of the impact of the transactions on their financial statements.

7. **Leveraging technology to support the governance and efficiency surrounding Indonesia's carbon market.** Implementing advanced technologies such as blockchain for transparent data recording and real-time data analytics can significantly improve the SRN PPI registry system. These technologies ensure accurate tracking and verification of carbon credits, thereby increasing the system's reliability and efficiency. By addressing existing technology issues and adopting innovations, Indonesia can maintain high standards of credibility and trust in its carbon market, ultimately supporting the market's growth and stability and contributing to the country's climate goals.

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Endnotes

No.	Source	Page
1.	IPCC. (2022, April 4). The evidence is clear: the time for action is now. We can halve emissions by 2030.	10
2.	World Economic Forum. (2023, September 4). The 1.5 C climate threshold: What it means and why it matters.	10
3.	SRN-PPI. (2021). SRN - Sistem Registri Nasional. Menlhk.go.id. https://srn.menlhk.go.id/index.php?r=home%2Findex	10
4.	Kompas Cyber Media. (2023, March 30). Sri Mulyani: Butuh Rp 4.002 Triliun untuk Kurangi Emisi Karbon hingga 2030.	10
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8.	UNFCCC. (2019). What Is the Kyoto Protocol? UNFCCC. https://unfccc.int/kyoto_protocol	12
9.	PwC. (2024). Net Zero Economy Index: The Pivotal Decade.	14
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11.	PwC Singapore. (2023). Enabling a Net Zero world. PwC. https://www.pwc.com/sg/en/publications/enabling-a-net-zero-world.html	16
12.	Ministry of Ecology and Environment of the People's Republic of China. (2024). Progress Report of hina's National Carbon Market.	21
13.	International Carbon Action Partnership. (2024). Emissions Trading Worldwide: Status Report 2024. ICAP. https://icapcarbonaction.com/system/files/document/240522_report_final.pdf	21
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15.	International Energy Agency. (2023). ASEAN Renewables Investment: Opportunities and Challenges.	22
16.	SRN PPI Database (2024)	25
17.	PwC Indonesia. (2023). Indonesia's Carbon Pricing Understanding the Basic Regulatory Framework.	26
18.	Australian Government Clean Energy Regulator (2024). Quarterly Carbon Market Report December Quarter 2023.	30
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