

IBC

Indonesian Business Council

EXECUTIVE SUMMARY

Preparing An Innovative and Globally Competitive Carbon Market in Indonesia:

Strategic Actions towards an Impactful Carbon Market

December 2023

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Abstract

Indonesia, an archipelagic economy with a continuously-growing US\$1.3 trillion GDP, is influenced by unique biodiversity and recognized as world's major exporter of natural resources. It also holds 75-80% of the world's carbon sinks. For instance its mangrove forests and peatlands store 20 and 37% of global carbon credits respectively, while rainforests store 25 Gt carbon. On one hand, these made Indonesia a potential hotspot for carbon market, that if valued at US\$ 5 per tonCO₂, could lead to US\$ 150 billion economy in revenue. On the other hand, Indonesia's emissions also increased during the COVID-19 recovery from 1.1 to 1.2 GtCO₂eq in 2022, making it the world's 6th biggest emitter. Though so, Indonesia has been strengthening its ambitions, committing to reduce GHG by 31.89% unconditionally or 43.2% with international support by 2030, and implementing carbon pricing and market is imperative to achieve this, among other methods such as result-based payments.

Carbon trading in Indonesia has so far been implemented in private manner and/or between coal-fired power companies, with the latter focused on compliance rather than voluntary that should be reinforcing each other. This is perhaps due to clear cost benefit, showed by mathematical model that offsetting in the carbon market is much more cost-efficient than installing, for instance, carbon capture technology, at US\$ 6.5/tonCO₂e vis-à-vis US\$ 92.5/tonCO₂e (assuming carbon price remains below \$100/ton CO₂e for the next couple of years). It is also important to note the social value of carbon market such as newly-generated carbon sequestration projects by local communities, environmental justice principles and ethical standards. In September 2023, Financial Services Authority (OJK) launched IDXCarbon at the Indonesian Stock Exchange with 16 companies recording 459.970 tonCO₂eq transactions, all to help address net zero targets while creating economic benefits and putting the first leaps in positioning Indonesia as a leader in this field.

To accelerate this progress, Government of Indonesia has been making strategic efforts in setting up grants and funding incentives through Badan Pengelola Dana Lingkungan Hidup (BPDLH) of the Ministry of Finance and national emission data management (SRN-PPI) at the Ministry of Environment & Forestry (KLHK). Though so, at infrastructure level, challenges exist in closing the innovation gaps and carbon market knowledge management, determining entity level emission caps, integrating centralized carbon registry system, and ultimately incentivizing industries beyond recognizing efforts through green taxonomy and sustainable financing. At system level, further challenges remain in continuing developing the long-term carbon trading roadmap and implementation acceleration champions, ensuring industrial viewpoints are accommodated and improving collaboration among ministries, institutions and private sectors.

Further, identified gaps in the regulatory scheme encompass carbon tax incentives, sectoral regulations, and the absence of frameworks for waste, agriculture, industry, and transportation sectors. Challenges within the current regulatory schemes involve multiple approval processes, mandatory national recognition, and administrative burdens for businesses engaged in Carbon Trading. To address this includes the enactment of comprehensive regulations by Ministries relevant to these sectors.

Now as Indonesia develops its outlook of the upcoming political cycle in 2024, its progressive private sector contribution should be further recognized and optimized, especially with the governance-level support. The country is in "crisis", where turning points will mean breaking through on many fronts if it truly wants to emerge as a winner in carbon market.

Keywords: Indonesia, carbon market, private sector, knowledge centre, sustainable financing.

1. Introduction

Carbon market or the procedure of emissions trading has been a point of discussion for nearly three decades. Article 17 of the Kyoto Protocol initially introduced the emission trading mechanism, which allows for states with spared permitted emission units to sell the excess capacity to other States that are over their targets.

In 2015, at the Paris COP21, the UNFCCC member states further reinforced their commitment to the Kyoto Protocol by establishing the Paris Agreement, requiring member states to submit NDC reports on a five-year cycle, with each NDC expected to make incremental progress towards higher and more measurable ambitions compared to the previous cycle.

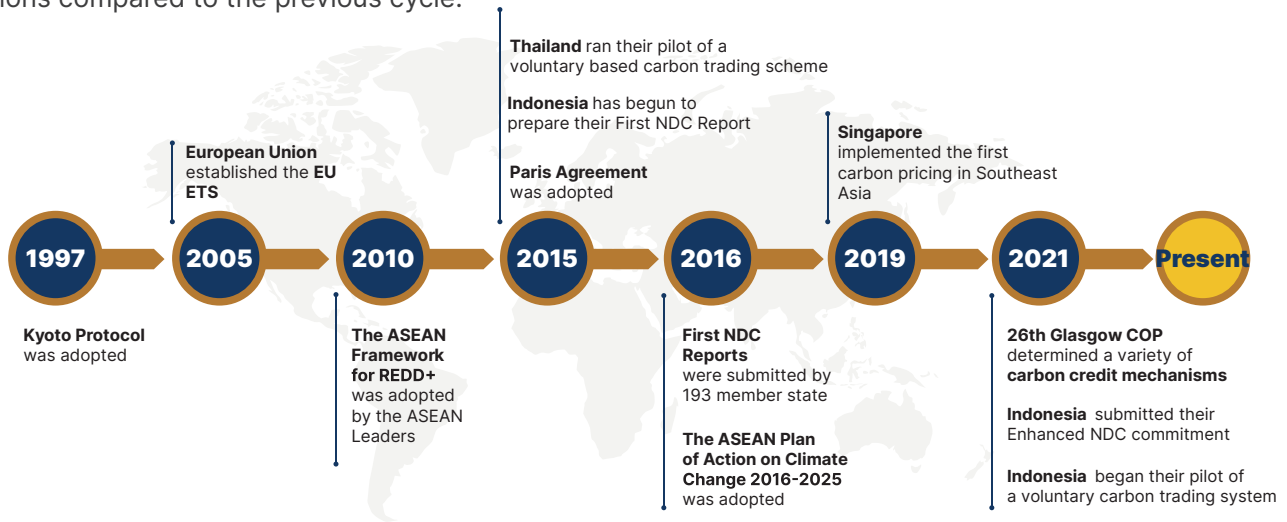


Figure 1. Selected Milestones of the Global Development of Carbon Market

With the launching of Carbon Exchange in September 2023, the government needs to identify the best way forward that maximizes impact, creates a path to accountability and establishes an ecosystem fit to purpose, both for the national as well as international interest. This whitepaper aims to provide insights on how to address these challenges.

2. Situational Overview

Emission Trends and Indonesia's NDC commitments

Indonesia's emissions experienced an uptick in the wake of the COVID-19 recovery period. Indonesia's GHG rose to 1.2 Gt CO₂eq in 2022, a noticeable increase from the 1.1 Gt CO₂eq recorded during the pandemic. Integral to this, in 2022, Indonesia is among the top 6 countries with the highest GHG-emitting country with a total share of 2.31% of the global emissions. This is in comparison to China with a total share of 29.16%, the United States 11.19%, India 7.33%, Russia 4.80%, and Brazil 2.44%.

Indonesia has sought to strengthen its climate ambitions through its latest NDCs, committing to reduce GHG emissions by 31.89% unconditionally (self-effort) or 43.2% conditionally (with international support) by 2030.

Through the Presidential Regulation 98/2021 concerning the Implementation of Carbon Pricing to Achieve the Nationally Determined Contribution Target and Control Over Greenhouse Gas Emissions in the National Development, the government further prescribes carbon pricing, including arrangements for carbon trading, carbon levies and result-based payments as one of the efforts to achieve Indonesia's NDC commitments.

Leveraging the green resources owned by Indonesia, the archipelago country has a concrete foundation for establishing a firm and expansive carbon market, which is predicted to contribute up to US\$ 150 billion to the national economy. Nevertheless, there are several challenges that should be addressed:

1. Systemic challenges

- Missing carbon trading roadmap
- The initial concept of the Carbon Exchange Roadmap provides minimum details of the industrial point of view
- The need to enhance Ministries/Institutions collaboration and public-private collaboration

2. Infrastructure challenges

- Innovation gap, including the missing MRV process guidelines and international expert panel/advisory panel
- Lack of industry recognition through carbon exchange and green taxonomy
- Minimum access to information and training regarding carbon market
- Lack of facilitation for industry participation within the market
- Inadequacy of the SRN-PPI as the primary integrated national registry for carbon
- Insufficient incentives for prospective/existing industry players joining the carbon market.

Indonesia's Carbon Market: A Developing Landscape

A pivotal aspect of Indonesia's pledges to fulfil their NDCs revolves around the implementation of carbon pricing mechanisms with key instruments being the Emissions Trading System (ETS) and the Carbon Tax. Indonesia has developed two carbon trading mechanisms, namely compliance-based and a voluntary-based carbon market.

Compliance Carbon Market (CCM) in Power Generation

Earlier this year, power generation was chosen as the first subsector to implement mandatory carbon trading due to its easily identifiable emissions calculations. The mandatory ETS is implemented in phases in Indonesia, with the first phase (2023 to 2024) only covers coal-fired power plants; the second phase (2025 to 2027) and third phase (2028 to 2030) are expected to include oil and gas-fired power plants and other coal-fired power plants not connected to the State Utility Company/Perusahaan Listrik Negara (PLN).

The trial phase involved 80 coal power plants (PLTU Batu Bara) with at least 100 MW of generation capacity, producing more than 75% of CO₂ emissions and succeeded in prompting 28 carbon transactions with 42,455.42 tonnes of CO₂ emissions, gathering 4,500 tonnes of CO₂ emissions from international offsets credit and 22,248.1 tonnes of CO₂ from the Emission Reduction Certificate/Sertifikat Penurunan Emisi (SPE).

Voluntary Carbon Market (VCM)

VCMs is a type of carbon market in which organizations voluntarily purchase credits from projects that (i) prevent CO₂ emissions, (ii) help reduce emissions, or (iii) permanently remove emissions from the atmosphere to offset some or all of their own carbon emissions. Standard setters verify these projects using different methods before issuing carbon offset credits as the issued products.

Prior to the ETS and carbon tax, Indonesia has been familiar with the Voluntary Carbon Market (VCM). There are already multiple active and registered Nature-Based Solutions (NBS) and Renewable Energy (RE) projects that function under the Voluntary Carbon Market (VCM) model's offsetting mechanism.

1. **Pertamina Geothermal**

PT. Pertamina Geothermal Energy (PGE) Tbk. currently oversees 15 work areas with a combined geothermal capacity of 1,877 MW (including Joint Operation Contract - JOC), with 7 of them are PGE Carbon Credit Projects, which encompasses not only CDM but also VCS and the Gold Standard.

2. **Katingan Mentaya Project**

Katingan Mentaya Project by PT Rimba Makmur Utama comprises a restoration and acacia plantation project spanning 157,875 hectares in Central Kalimantan and is one of the VCM pioneers, established since 2010.

3. **ICDX Indonesian Carbon Market Platform**

The ICDX Group, a commodity exchange center, has launched a trading platform for carbon that participates on the Indonesian carbon market.

4. **Other Notable Efforts**

The Clean Development Mechanism (CDM) in Indonesia has completed 215 projects, reducing 10.1 million tonnes CO₂ emissions. In addition, the Joint Credit Mechanism (JCM) has reduced 329.5 thousand tonnes of CO₂ through 106 projects in Indonesia.

Carbon Exchange through IDXCarbon

In September 2023, the Indonesian Stock Exchange (PT. Bursa Efek Indonesia) launched IDXCarbon to address multiple needs: accelerating decarbonization, supporting sustainability goals, providing a transparent and reliable platform for carbon trading, creating economic benefits, and positioning Indonesia as a leader in the field.

As of October 12, 2023, IDXCarbon has recorded transactions of 459.970 tonCO₂ equivalent, which is significantly higher than Malaysia's Carbon Exchange performance of 166.500 tonCO₂ equivalent transaction from its establishment in March 2023 until October 2023.

Grounded in a robust legal framework, IDXCarbon derives its mandate from the Law No.4/2023 on Financial Sector Development and Reinforcement, OJK Regulation No.14/2023 on Carbon Trading through Carbon Exchange, and Circular Letter OJK No.12/04/2023 on Procedures for Carbon Exchange, which in accordance with that, IDXCarbon provides 4 (four) trading mechanisms.

1. **Auction**

Prospective buyers bid the volume they seek and the price they are willing to offer, then, the bidded carbon units are offered to the highest bidders.

2. **Regular Trading**

Operates via a continuous auction framework where all parties, at any given time, can submit their buy-and-sell offers.

3. **Negotiated Trading**

Offered by the IDXCarbon for trades that have been pre-negotiated outside the system.

4. **Marketplace**

A space where Emission Mitigation Project Owners can offer their carbon units at a predetermined price, granting them greater control over their sales strategy.

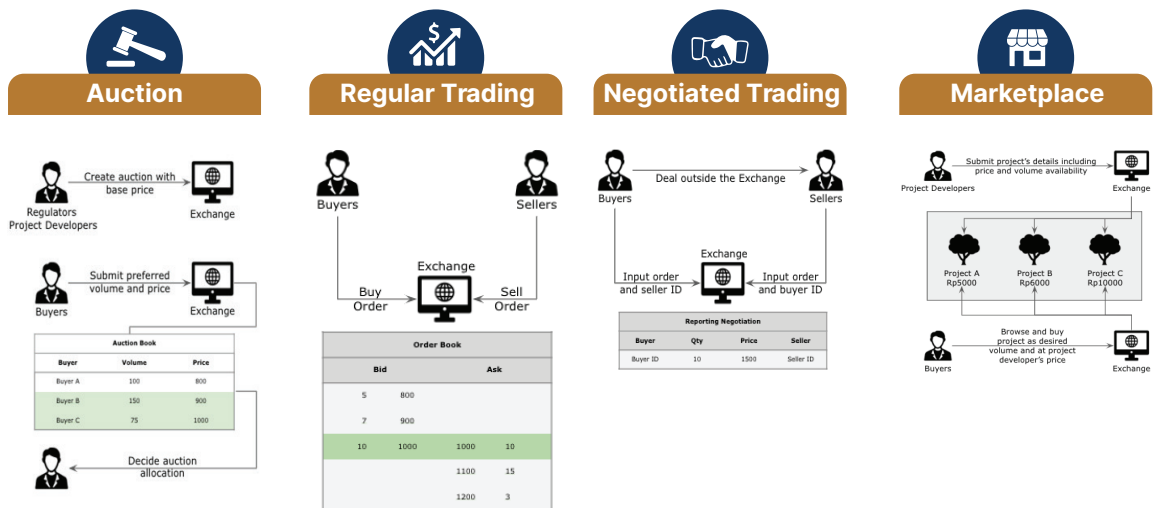


Figure 2. IDXCarbon Trading Mechanism

Carbon Market Registration

Sistem Registri Nasional Pengendalian Perubahan Iklim (SRN-PPI)

The Presidential Regulation No.98/2021 provided an avenue for the establishment of the National Registry System for Climate Change/Sistem Registri Nasional Pengendalian Perubahan Iklim (SRN-PPI) as a response to the need for integrated data to monitor and strengthen Indonesia’s effort in achieving its NDC. The SRN-PPI’s current activities are serving as the gatekeeper for data collection, registration, and a list of climate mitigation efforts and projects.

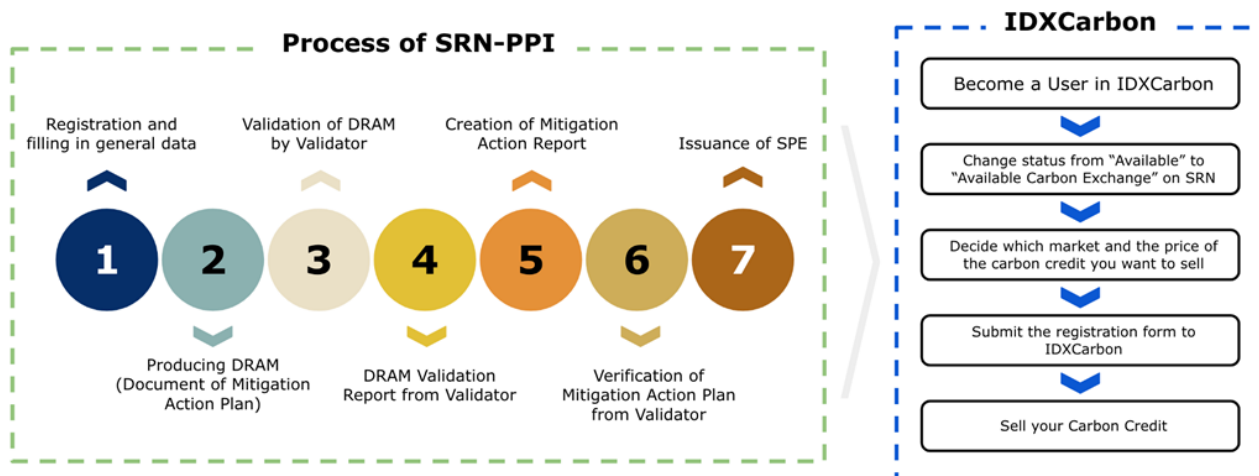


Figure 3. Mechanism to joining IDXCarbon through SRN-PPI

1. The system functions as a database for data collection and reporting.
2. SRN-PPI acts as a registration platform for climate mitigation efforts and activities,
3. The system serves as a recordkeeper of local, sub-national & national climate mitigation efforts, allowing users to independently monitor progress in achieving emission reduction targets in accordance with NDC commitments,
4. SRN-PPI serves as a recordkeeper for both BAU players and green project developers, potentially bridge the supply and demand side in the carbon market.

The most recent development is registration to the system becoming a requirement for participation in the IDXCarbon. Hence, registered projects have an advantage of early and smooth participation in the currently existed Carbon Exchange in Indonesia.

Aplikasi Penghitungan dan Pelaporan Emisi Ketenagalistrikan (APPLE Gatrik)

introduced by the Ministry of Energy and Mineral Resources (Kementerian Energi dan Sumber Daya Mineral or ESDM), APPLE-GATRIK is intended to help power generation companies report their GRK emissions based on established standards and methodologies, aligning with the government’s commitment to reduce GRK emissions, as outlined in Indonesia’s Enhanced Nationally Determined Contribution (Enhanced NDC) under the Paris Agreement, APPLE-GATRIK is expected to facilitate data collection, standardize the inventory methodology, and contribute to achieving emission reduction targets in the power generation sector. It is accessible online through the laporan-emisigatrik.id website.

3. Selected Benchmark and Best Practices

By benchmarking countries with renowned compliance carbon markets and two voluntary carbon markets, this section serves as a valuable resource, offering best practices that will serve as insights for the current standard to curate its own long-term strategy and playbook that can facilitate the relevant industries comprehension.

Compliance Carbon Market (CCM)

Functioning according to emission cap allowances, the selected CCMs pose distinctive market models and features. These encompass industry-centric incentivization schemes and complementary tools designed to foster and perpetuate active industry involvement.


	Industry- Rewarding Incentivization Scheme and Facility	MRV Protocol/ Facility
	Social Climate Fund, Innovation Fund, and Free Allocation Incentivization	Social Climate Fund, Innovation Fund, and Free Allocation Incentivization
	EITE Sector Transitory Allowance, Sustainable Bond Grant, GST Voucher-U-Save Rebate, and Resource Efficiency Grant for Energy	Emission Data Monitoring and Analysis (EDMA) system
	Green Credit Incentivization Programme	Perform, Achieve, and Trade (PAT)
Regional Greenhouse Gas Initiative, USA	RGGI CO2 Allowance Tracking System (RGGI COATS) State-to-State Coordination	Independent Market Monitor

Table 1. Distinctive compliance market models and features

Voluntary Carbon Market (VCM)

In engaging in voluntary emission trading, entities often maximize multiple market instruments, which may include investments in green bonds and active participation in exchange platforms.

	Credits Accreditation	User Support Facilities
Climate Impact X	Supported by the International Advisory Council and registered intermediaries for global standardized credits, i.e., Verra and Gold Standard	Supported by the International Advisory Council and registered intermediaries for global standardized credits, i.e., Verra and Gold Standard
Carbon Trade Exchange	Facilitates and acknowledges various global standards by establishing registries for each standard	Wholesale rates, transparent registry, global access and exposure, and revenue-sharing framework

Table 2. Distinctive voluntary market models and features

Selected Global Carbon Credit Certification Standards

In pursuit of enhancing the established SRN-PPI and national credit standards, it is essential to conform a comprehensive understanding of carbon credit certification to the global issuance standards. Such knowledge plays a pivotal role in fostering a dynamic, internationally competitive market environment. This analysis delves into a thorough examination of four prominent global carbon credit certification standards, scrutinizing their guiding principles, the credit issuance process, and the supporting market features designed to optimize operational efficiency. The objective is to obtain valuable lessons and insights from these standards, which can be applied to the ongoing process of validating and refining Indonesia’s creditworthiness and regulatory standards.

Four of the selected global certification standards examined are **Integrity Council for the Voluntary Carbon Market (ICVCM), Verra’s Verified Carbon Standard (VCS), The Gold Standard, and the American Carbon Registry Standard.**

Indicator	Credits Accreditation
Credit Issuance Process	<ol style="list-style-type: none"> 1. Clear criterion of credit eligibility: These criteria should be communicated to the project developers to ensure that the carbon credits generated consistently adhere to the rigorous standards of high quality and integrity. 2. Digitized registration and verification process: Streamline the registration and verification process through user-friendly websites and provide a structured, step-by-step guide for project developers to guide them through the process.
Monitoring Procedure	<ol style="list-style-type: none"> 1. Employing various instruments for performance monitoring: Utilize systematic analysis of market and trends data along with the stakeholders’ input to ensure all potential risks and errors inside the registered projects are preemptively mitigated. 2. Third-party monitors and evaluators: Consider employing a third party to act as an independent evaluator of the registered projects to contribute to a more objective and robust evaluation process.

Table 3. Benchmark Key Takeaways

4. Indonesia's Carbon Market Regulatory Landscape

Carbon Trading Related Regulations in Indonesia

PPSK Law

1. OJK has additional regulatory authority over secondary trading of instruments related to carbon economic value.
2. Introduces a market-based approach to reduce GHG emissions through the buying and selling of Carbon Units.
3. Elaborates on the trading of carbon, both domestically and internationally, through carbon exchange mechanisms.
4. OJK given the responsibility of licensing of companies engaged in carbon trading activities and oversight.

HPP Law

Impose a carbon tax on companies that emit carbon waste, as a means of mitigating climate change.

PR 98/2021

1. Outline climate change mitigation action involves stages: GHG emission inventory, establishing emission baseline, setting mitigation targets, and creating action plans.
2. Introduces the concept of carbon economic value/nilai ekonomi karbon (NEK) which assigns economic value to each unit of greenhouse gas.
3. Introduces Carbon Trading as one of the mechanisms for implementing the NEK and establishes SRN PPI acts as the overseeing body that is responsible for monitoring carbon emissions within the context of Indonesia's NDC.
4. Introduces Results-Based Payments (RBP) an incentive or payment obtained from the results of GHG emission reduction achievements.
5. Introduces a carbon levy imposed on goods and/or services with carbon content, emissions potential, or environmental impact.
6. Requires businesses to obtain certification for their emission reduction achievements in the form of SPE GRK.

MOEF Reg. 21/2022

1. Introducing two types of Carbon Trading—voluntary and mandatory, the former involves emissions trading or cap-and-trade, while the latter, baseline and credit/offset GHG emissions.
2. Allows business actors who have SPE-GRK can carry out Carbon Trading domestically and abroad.
3. Cross-sector Carbon Trading (both domestic and foreign).
4. Carbon Trading is laid out to span across sectors such as energy, waste, and forestry.
5. Business actors engaging in foreign Carbon Trading are required to register through the SRN PPI.
6. Specifies that certificates issued by external certification bodies can be deemed equivalent to the SPE-GRK standard.

MOEF Reg. 7/2023

1. Climate Change Mitigation Actions is laid out to include activities that reduce GHG emissions, increase carbon sequestration, and strengthen carbon stocks.
2. Lays out areas targeted by Carbon Trading in the forestry sector.
3. Non-Tax Revenue Implementation (PNPB).
4. Outlines the collection of non-tax state revenues related to Carbon Trading within the forestry sector.

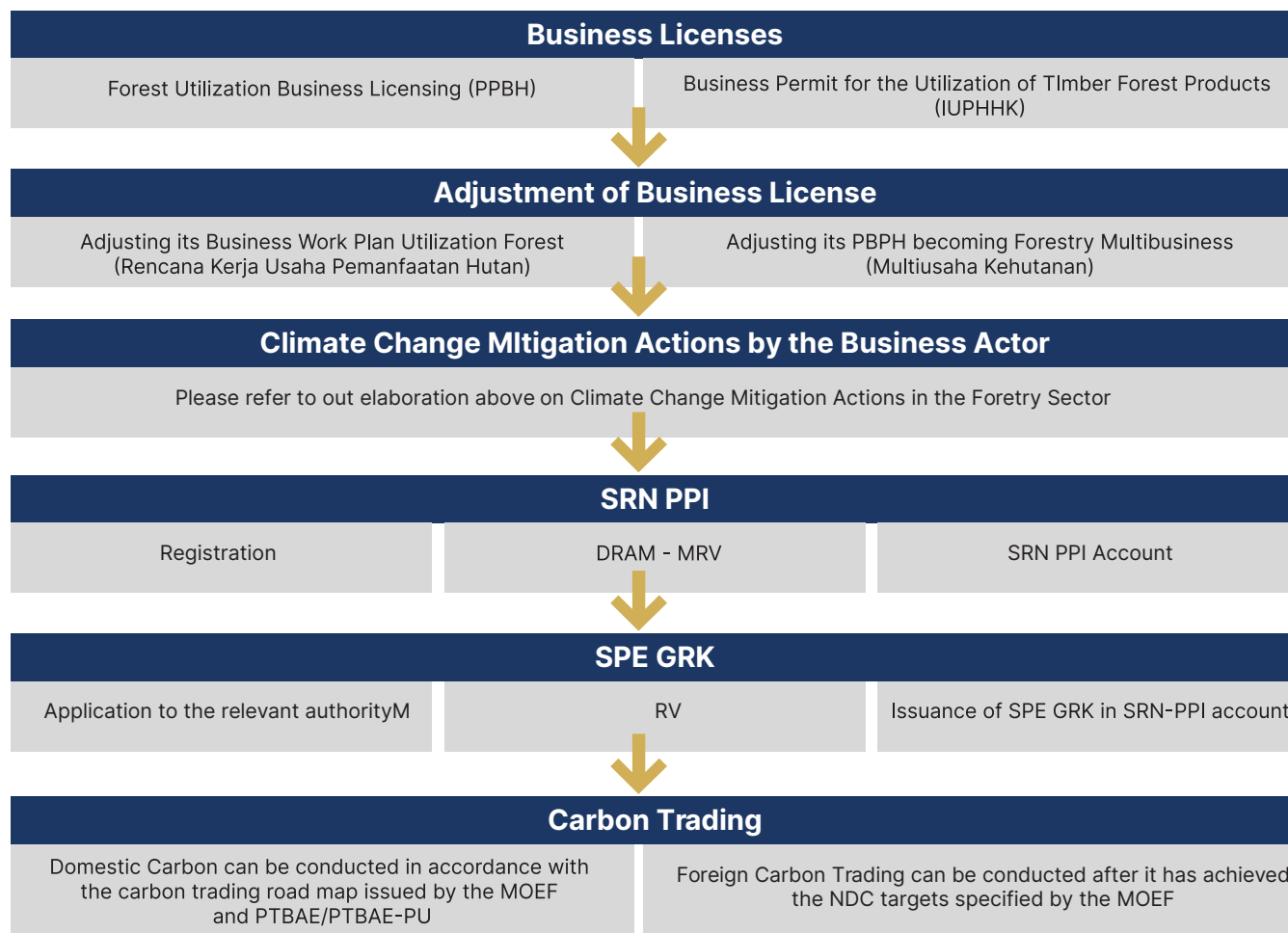


Figure 4. Flowchart of the Implementation of Carbon Trading in Forestry Sector

MOEMR Reg. 16/2022

1. Outlines the procedure to determine PTBAE for the power generation sub-sector, which involve establishing the GHG Emission Cap for power plants.
2. Requires business actors involved in Carbon Trading to design a plan for monitoring every unit of their power plant GHG emission.
3. Determination of PTBAE-PU is stipulated to be conducted by the MOEMR no later than every 31st of January.
4. Detailed mechanisms on Carbon Trading in the power generation sub-sector.

POJK 14/2023

1. Mandates market organizers in the capital market to conduct Carbon Trading through the Carbon Exchange by enacting POJK No.14/2023.
2. Organizers of Carbon Exchange are mandated to operate as limited-liability companies (PT) based in Indonesia, requiring business licenses obtained through the OJK.

3. Transactions of Carbon Units can occur directly between relevant parties or through brokers.
4. Organizers are required to have a minimum of two BOD members domiciled in Indonesia, along with two BOC members. The OJK oversees the compliance of these members with regulatory standards.
5. Organizers of Carbon Exchanges in Indonesia bear a responsibility to uphold measured, reasonable, and efficient practices in carbon trading.
6. Eight mandatory reports, including monthly transaction summaries, annual activity reports, and reports on violations and sanctions, are required to be submitted to the OJK within specified timeframes.

IDX Decree 00295/2023

1. PTBAE-PU and SPE-GRK are the Carbon Units eligible for registration and trading on the Carbon Exchange.
2. Carbon exchange providers can facilitate trading of foreign Carbon Units, listed or unlisted in SRN PPI, by submitting registration requests to the OJK.
3. Providers have the authority to approve or reject registration requests from users, prospective users, or relevant ministries.
4. IDX may assign codes for each carbon unit, whether listed or unlisted in SRN PPI but recorded in the Carbon Exchange.
5. Users must ensure registered Carbon Units are not traded, transferred, or retired outside Carbon Exchange procedures.
6. Providers can coordinate with the MOEF or accredited international registration system providers for compliance.

IDX Decree 00296/2023

1. Stipulates technical aspects of the trading of Carbon Units through IDX Carbon.
2. Carbon Exchange has four segments: Auction Market, Regular Market, Negotiation Market, and Non-Regular Providers Market.
3. Auction Markets: PTBAE-PU and SPE-GRK. trading.
4. Regular Market Participants: Emission Trading Businesses for PTBAE-PU, and both Emission Trading and Non-Emission Trading Businesses for SPE-GRK.
5. Negotiation Market Participants: Emission Trading Businesses for PTBAE-PU, and both Emission Trading and Non-Emission Trading Businesses for SPE-GRK.
6. Non-Regular Market: Project Owners or designated participants.

IDX Decree 00297/2023

1. Stipulates the regulations on the users of the service from IDX Carbon.
2. Types of users include Emission Trading Businesses, Non-Emission Trading Businesses, Project Owners, and other parties approved by the OJK.
3. Relevant Ministries may utilize facilities provided by the Carbon Exchange in conducting carbon trading activities.
4. Emission Trading Businesses: Eligible to acquire PTBAE-PU allocation through purchases in the Carbon Exchange Auction Market.
5. Non-Emission Trading Businesses: Prohibited from sales and purchases of PTBAE-PU.
6. Project Owners: Obligated to register SPE-GRK according to carbon unit registration regulations.

IDX Decree 00298/2023

1. Stipulates the regulations on the supervision of the trading of Carbon Units in IDX Carbon.
2. Trading Supervision: Users of Carbon Exchange services include Emission Trading Businesses, Non-Emission Trading Businesses, Project Owners, and other parties approved by the OJK.
3. Prohibited Actions: Relevant Ministries may utilize facilities provided by the Carbon Exchange in conducting carbon trading activities.
4. Monitoring Parameters: Allowed to conduct sales and purchases of PTBAE-PU in the Regular Market and Negotiation Market.
5. Trade Monitoring Prohibited from sales and purchases of PTBAE-PU.

5. Evaluating Indonesia’s Climate Commitments and Carbon Market Potential

Most environmental problems deal with the issue of negative externality. Despite the possibility of solving the problem using private negotiation as stated by Coase Theorem, many economists do see a role of government in helping to solve environmental problems. There are three broad categories of instruments that can be used by the government.

	Advantages	Disadvantages
Command-and-Control (CAC)	<ul style="list-style-type: none"> CAC relies on technological or performance standard set by the government. CAC does not need individual firm’s cost information. 	<ul style="list-style-type: none"> No incentive to improve beyond the set standard. Limiting firms to find the most cost-effective methods. Vulnerable to political shift. Requires strict and strong authority.
Market-based (Price Influence)	<ul style="list-style-type: none"> Correct inefficiency market through tax reforms. Generating funds for reductions in distortionary tax. 	<ul style="list-style-type: none"> Tax may raise product prices. Tax potentially misallocating market, creating market inefficiency.
Market-based (Quantity Limit)	<ul style="list-style-type: none"> Similar to CAC where the government sets the cap. Autonomy for free market capitalism. Promotes innovation Accelerate emission reductions through cap decline. Generate government revenues through auction. 	<ul style="list-style-type: none"> The need for a strict and thorough design of cap. On ethical grounds, emission trading allows the wealthy to evade their responsibilities to reduce emissions.
Information-based	<ul style="list-style-type: none"> Improve credibility through transparent practices (public disclosure). Autonomy for businesses to adopt environmental policies and disclosure. Allows a unique market position as green player champions. 	<ul style="list-style-type: none"> Will only solve asymmetric information, issues on externalities and public good provisions still exist. Some may choose not to disclose information due to voluntary nature of the mechanism. High chance for misinterpretations, exaggerations, and greenwashing.

Table 4. Advantages and disadvantages of emission reduction instruments

Compliance Carbon Market (CCM)

A compliance market is a market system used by companies and governments that by law have to account for their GHG emission. The compliance market legally requires companies to hold permits equal to their emission based on a binding emission cap or regulation.

	Scope	Issue
Compliance Carbon Market (CCM)	Policy interaction	Interactions and boundaries between policies must be well-defined and clearly articulated.
	Target setting and flexibility	Emissions caps must be stringent and well-designed to ensure abatement is in line with national targets and commitments.
	Legal framework & enforcement	Government should have the capacity to build a strong legal foundation, with oversight and enforcement arrangements.
	Institution and MRV capacity	The implementation of new ETSs requires the establishment of new rules and processes related to the MRV of emissions.
	Allocation mechanism	Introducing a carbon price through an ETS can lead to an increase in production costs for the industry, especially in cases where allocations are not made for free.
	Market functions	The need for a high degree of transparency concerning market-sensitive data.

Table 5. Issues in CCM

Voluntary-based Market (VCM)

Voluntary markets allow firms and corporations to achieve their climate goals using carbon credit from projects that reduce or sequester carbon emissions.

	Scope	Issue
Voluntary Carbon Market (VCM)	Lack of regulation	With no long-term regulatory obligation or pricing signals on carbon, firms are left to chart their net-zero path with little guidance or policy vision.
	Corresponding Adjustment (CA)	Mandating CA for VCM has led some developing countries to ban exports of carbon credit due to concerns that the trade (correspondence adjustment) might hinder their NDCs’ achievements.
	Bifurcation of credit types	Global VCM has been dominated by avoidance credit, such as preventing deforestation and developing RE, whilst removal credits are scarce.
	Greenwashing concerns	Firms may use VCM in an effort to look “green” while failing to take real climate action.

Table 6. Issues in VCM

Cost and Benefit Consideration of Participating in Carbon Market

In the effort to pursue emission reduction targets, there are at least two schemes which can be used by industries, i.e., participate in the carbon market and invest in green technologies. Both mechanisms entail trade-offs for companies in terms of investment costs.

Industries participating in carbon markets may face additional compliance costs related to meeting emissions reduction targets or purchasing carbon credits. These costs can be substantial, particularly for industries with high baseline emissions. On the other hand, reducing emission by investing in green technologies often

requires the adoption of new or the enhancement of existing ones. Industries may need to invest in cleaner and more sustainable production processes, which can be capital-intensive.

Considering the options to meet the targeted number of emission reductions, a simple cost and benefit analysis (CBA) is conducted to shed light on which scheme is more beneficial and cost-saving for business entities.

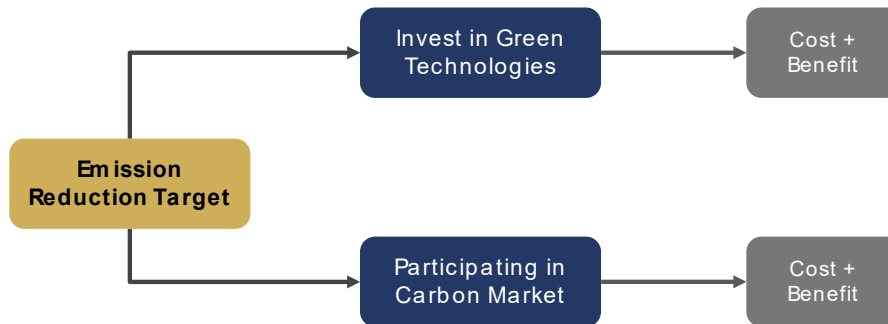


Figure 4. Emission Reduction Mechanisms

To delve deeper into a real application of the CBA concept explained in the previous section, a case example of CBA in a coal-fired power plant (CFPP) is performed. Estimation is made using two scenarios of green technology deployment compared to offsetting in the carbon market: 1) Co-firing scenario – 10% co-firing with biomass; 2) CFPP with Carbon Capture Storage (CSS).

		Baseline	Co-firing with Biomass	CFPP with CSS
Existing Technology	NPV Total Cost (USD)	220,710,978		
	Total Emission (tonne CO2e)	8,440,594		
Deploying New Technologies	NPV Total Additional Cost (USD)		3,422,531	321,035,213
	Potential Emission Reduction (ton CO2e)		675,248	3,376,238
	Average cost per ton CO2e (USD) – over 30years period		5.1	92.4
Offsetting in Carbon Market	NPV Total Additional Cost (USD)		4,376,119	21,880,596
	Potential Emission Reduction (ton CO2e)		675,248	3,376,238
	Average cost per ton CO2e (USD) – over 30years period		6.5	6.5

Table 7. Result of CBA for CFPP

Result

From the result above, two implications are drawn. A 10% biomass co-firing is less costly (USD 5.1/ton CO₂e) than offsetting in the carbon market (USD 6.5/ton CO₂e). While 10% biomass co-firing does not require incremental CAPEX, it raises OPEX for additional feedstock – net off reduction of fuel cost (coal). However, additional CAPEX will be incurred if the co-firing rate is more than 10%, which might alter the conclusion in this analysis.

Meanwhile, offsetting in the carbon market (USD 6.5/ton CO₂e) is much cheaper than installing carbon capture technology (USD 92.5/ton CO₂e). This result is supported by the International Energy Agency finding which estimates that utilization of CCS/CCUS will cost up to USD 120/ton CO₂e and will significantly increase the cost of steam power generation, approximately USD 0.08 – 0.1/kWh. This number clearly indicates that, in the meantime, reducing emission through the carbon market is considered cost-efficient than installing carbon capture technology, assuming carbon price remains below \$100/ton CO₂e for the next couple of years.

Indonesia’s NDC and National Climate Budget: A Risky Road

Indonesia’s Enhanced NDC serves as a critical pathway for the integration of climate change considerations into the country’s broader development strategy. Nevertheless, transforming these ambitious plans into reality comes with a hefty price tag.

According to Indonesia’s Ministry to Finance, for the country to meet its climate objectives as per the NDC by 2030, a substantial investment of USD 4.4 trillion is necessary.

The NDC strategy itself calls for nearly USD 294.97 billion to be dedicated to emission reduction initiatives, while an additional USD 77.81 billion should be channelled towards climate adaptation measures. The total funding requirement to achieve the carbon emission reduction target in Indonesia in the energy and transportation sector, especially the costs of converting or transitioning fossil energy to renewable energy, reached IDR 3,500 trillion. These estimates amount to almost the total of the 2022 national budget, which is set at IDR 3,106.4 trillion.

Further challenges exist in the fact that the government on average only allocates 3.5 percent of the national budget (APBN) for climate change mitigation and adaptation activities.

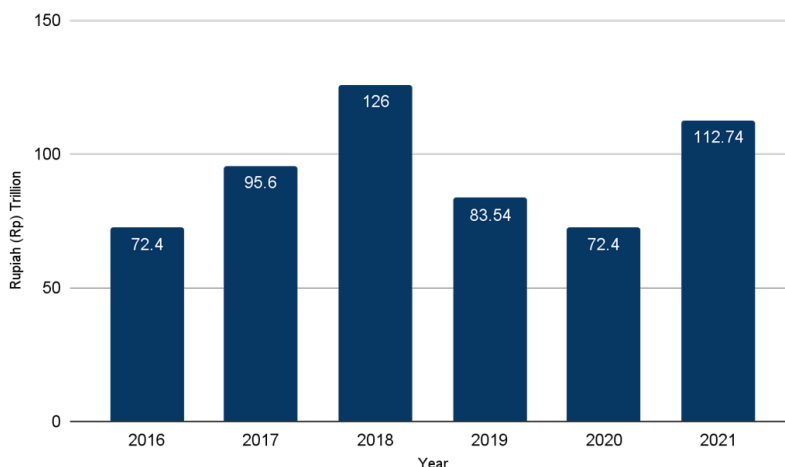


Figure 5. Indonesia’s National Climate Budget (2016-2021)

This condition illustrates the magnitude of the risks that could occur if climate funding only relies on the national budget. Differentiation of funding sources through innovative financing instruments, global funding access and private investment is inevitable, thus one potential source of funding to be considered can be explored through private and blended investment under the Carbon Pricing scheme.

1. Research on the potential domestic economic values of the carbon market through nature-based projects and solutions reveals that the total possible carbon credits have a high degree of viability in 2030 earning a potential revenue of Rp. 23 billion. According to KLHK, as of 2020, the potential of economy and carbon trading in Indonesia will reach Rp 350 trillion for the next five years, in accordance with the area of forests in Indonesia.
2. The value of the carbon trading scheme is explored using the estimated baseline carbon prices in the global and national landscape. By 2030, the scale of Carbon Trading transactions in Indonesia could span from Rp. 37 trillion to Rp 229 trillion using global market carbon prices (Rp. 41,400 to Rp. 251,100 per tCO₂e), or approximately Rp. 27 trillion based on the local carbon tax rates (Rp. 30,000 per tCO₂e).
3. By classifying carbon emissions as a commodity, as seen in Table 8.

(Un)conditional Mitigation Scenario	Non-tax revenue potential (IDR billion)	
Sector	Norway	EUA
Energy	19,281	52,211
Waste	675	1,829
IPPU	169	457
Agriculture	553	1,496
Forestry	30,517	82,640
Total	51,195	138,634

(Un)conditional Mitigation Scenario	Non-tax revenue potential (IDR billion)	
Sector	Norway	EUA
Energy	24,438	66,178
Waste	1,596	4,323
IPPU	200	540
Agriculture	246	665
Forestry	39,912	108,080
Total	66,392	179,788

Table 8. Potential state revenues from carbon trading using projected Norwegian carbon prices and EU Allowances

Social Value of the Carbon Market

1. The “polluters pay” framework embodies a fundamental principle of environmental justice and economic responsibility in the context of carbon markets. At its core, it mandates entities responsible for emitting GHG emissions to bear the financial burden of the environmental damage they cause. When applied to the realm of carbon emissions, this principle can be paired with the social costs of carbon, which quantifies the economic damages from emitting a single metric ton of GHG. By instituting mechanisms

such as carbon taxes, carbon permits, or cap-and-trade mechanisms, polluters are not only made to pay for their emissions.

2. Considering the inclusive nature of the market-based mechanism, carbon market can provide a chance for local communities to engage in carbon sequestration projects like reforestation, agroforestry, or sustainable land use practices; which, in turn, generate carbon credits that can then be sold. The revenue from these sales can be used to fund local community projects, from infrastructure to education. This can clearly be seen in projects implementing REDD+ schemes, which at heart ensure that local communities receive direct investments that could finance their livelihoods.

Environmental Value of the carbon market

Carbon market implementation can be substantial to sustain the country's environmental objectives:

1. Part of revenues from the market can act as much-needed subsidies for the first climate action pillar on the Improvement of Environmental Quality.
2. Through offsetting mechanisms, the carbon market can encourage the use and investment to develop more sustainable technologies. Integral to this, revenues can be allocated for the high capital expenditure (CapEx) projects in the renewable energy sector, making it financially viable for companies to transition away from fossil fuels and thus contribute to climate stability.
3. Projects that protect or restore forests, wetlands, and other natural habitats can earn carbon credits by sequestering carbon dioxide.
4. The existence of a carbon market can raise environmental consciousness.

Takeaways






The examination of Indonesia's journey towards achieving its NDC as an integral part of Indonesia's development framework and addressing the financial challenges hindering its climate mitigation and adaptation efforts reveals a promising avenue through the carbon market. Hence, the following key takeaways are presented:

1. **Compliance market vs. voluntary market in Indonesia:** The pressing need for Indonesia is to reinforce a compliance market to fulfil its NDC targets, whilst maintaining a voluntary market as a complementary mechanism supporting the compliance market.
2. **Regulation and Ethical Standards for Voluntary Markets:** Greenwashing usually occurs due to inadequate control environment. The government should: (a) develop a proper standard indicators on greenwashing, (b) establish a set of provisions or guidelines on public dissemination by the business industries; (c) to make the provisions as the fundamental principles in the VCM; (d) Develop incentives schemes for business industries.
3. **Potential revenue for the carbon market:** Carbon market has the potential to generate potential revenue ranging from IDR 27 trillion to IDR 8,000 trillion depending on the availability of high-quality carbon credits, capacity of offsetting/insetting projects, fluctuations in carbon prices, among other influencing factors.
4. **Social & environmental values of the Carbon Market:** The carbon market has the leverage to support and amplify the voices and participation of local communities. In addition, its implications to address the national climate budget constraints makes it a comprehensive and transformative tool for the nation in generating additional revenues to be allocated for the high capital expenditure (CapEx) projects in the renewable energy sector.
5. **Market-based approach is the most cost-effective:** Cost-Benefit Analysis reveals that, although a 10% biomass co-firing is less costly than offsetting in the carbon market, offsetting in the carbon market (USD 6.5/ton CO₂e) is much cheaper than installing carbon capture technology (USD 92.5/ton CO₂e).

Recommendations

This whitepaper recommends the following tactical short-term and strategic long-term initiatives to strengthen the competitiveness and impact of Indonesian carbon market:

Short Term

- 1  **EDUCATE**
Establishing a Carbon Market Knowledge Center (CMKC).
- 2  **ENHANCE**
Enhancing SRN PPI as an integrated national registry for carbon.
- 3  **ENCOURAGE**
Urging the public sector to determine and calculate emission caps (PTBAE) at the entity level.
- 4  **EQUIP**
Equipping industry players with funding opportunities & grant facility by the IEF/BPDLH.
- 5  **RECOGNIZE**
Industry recognition through carbon exchange and green taxonomy.

Medium to Long Term

- 1  **APPOINT**
Appoint an industry champion & form an acceleration team to determine the Indonesian carbon market strategy
- 2  **DEVELOP**
Developing a Carbon Trading Roadmap that comprehensively map the supply chain
- 3  **REASSESS**
Reassessing the Carbon Exchange Roadmap & RPOJK on Carbon Exchange

Strategies, Stakeholders and Action Items

This whitepaper further explains the strategies required to implement its recommendations, including what stakeholders are needed to get engaged:

Short Term



Building a robust information center for industry to participate in carbon market, a Carbon Market Knowledge Center (CMKC)

Key strategies:

1. Align carbon market evolution with NDC objectives through comprehensive education, particularly for industry players, and establish the Carbon Market Knowledge Center (CMKC).
2. Enhance carbon exchange by positioning the CMKC as a dynamic platform fostering cooperation between private, public, and people sectors, offering tailored solutions through an advisory board, expert panel, carbon market supply chain roster, and operational team.
3. Establish the CMKC in strategic phases, including preparation, platform development, stakeholder launch, and initial matchmaking, to create a centralized information repository and raise awareness for active stakeholder participation taxonomy, encourage participation, and promote business recognition within a sustainable framework.



Enhancing SRN PPI as an integrated national registry for carbon

Key stakeholders: Align carbon market evolution with NDC objectives through comprehensive education, particularly for industry players, and establish the Carbon Market Knowledge Center (CMKC).

Strategic enhancement initiative:

1. Foster collaboration between stakeholders.
2. Streamline business processes (registration, verification)
3. Improve user experience through website UI/UX overhaul.



Urging the public sector to determine and calculate emission caps at the entity level (PTBAE)

Key strategies:

1. Address challenges in determining and enforcing emission caps at the entity level (PTBAE) by prioritizing sectors for a gradual transition and improving market liquidity.
2. Propose a transformative strategy to decentralize emission limits from national to entity levels, requiring the development of a comprehensive “whole-of-government” framework for effective regulation.
3. Recommend a strategic three-phase approach to drive the public sector toward setting and measuring emission caps at the entity level (PTBAE).



Equipping industry players with funding opportunities & grant facility by the IEF/BPDLH

Key strategies:

1. Address obstacles hindering industry awareness and visibility of IEF/BPDLH incentives through strategic debottlenecking, focusing on improved accessibility to the IEF/BPDLH portal.
2. Empower industry players with IEF/BPDLH funding opportunities through a three-phase strategic plan focused on disseminating information, implementing a comprehensive communication strategy, and actively involving IEF/BPDLH as a focal point.



Maximizing the participation for businesses within the Carbon Exchange & Green Taxonomy to pave the way for recognition

Key strategies:

1. Engage industry players, recognize efforts aligned with NDCs, and promote Indonesian sustainable taxonomy participation for credibility.
2. Enhance carbon exchange transparency by including industry pioneers and mitigating greenwashing concerns.
3. Implement a three-phase debottlenecking initiative to refine taxonomy, encourage participation, and promote business recognition within a sustainable framework.

Medium to Long Term



Appoint an industry champion and form an acceleration team to determine the Indonesian carbon market implementation strategy.



Finalizing the Carbon Trading Roadmap

- KLHK should choose a capable focal point (Minister of Environment and Forestry's directive No. 21/2022).
- Assemble a team of experts & technical professionals.
- Outline the supply chain, define technical roles, and ensure policy consistency for effective coordination in advancing Indonesia's carbon market.



Reassessing the Carbon Exchange Roadmap

- Incorporate global best practices by actively engaging with industry experts and ensure the roadmap aligns with S.M.A.R.T. principles—Specific, Measurable, Attainable, Realistic, and Time-specific. This will pave the way for an internationally compliant, business-friendly environment, further boosting the green economy.



IBC

Indonesian Business Council