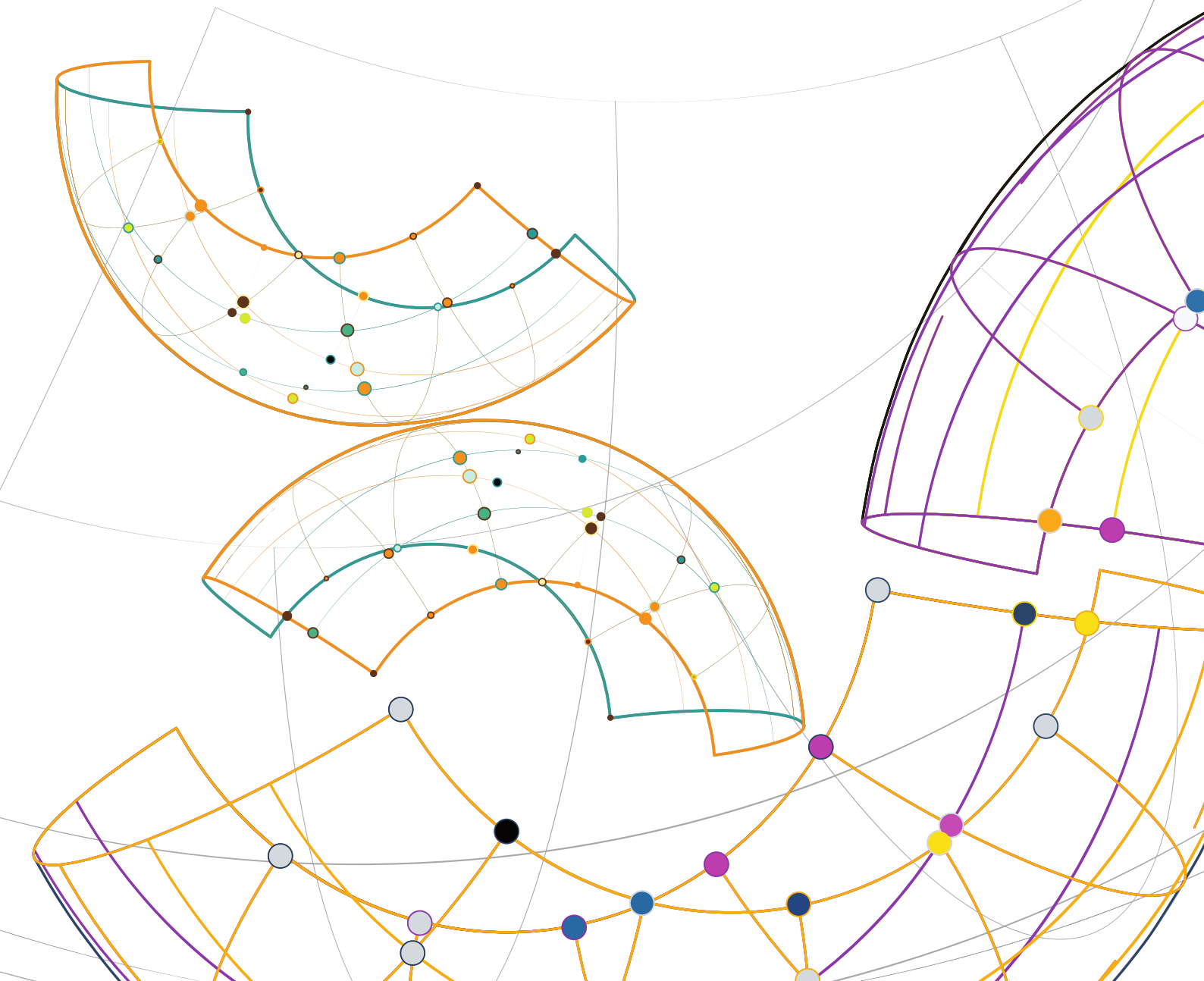
POLICY PAPER

Emerging Trends, Policy Signals and Pathways for Credible Carbon Pricing

China, Japan, Republic of Korea, Indonesia, Philippines, Thailand, and Viet Nam



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Emerging trends, policy signals and pathways for credible carbon pricing: China, Japan, Republic of Korea, Indonesia, Philippines, Thailand, and Viet Nam.

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Acronyms

ACCF:	ASEAN Common Carbon Framework
ASEAN:	Association of Southeast Asian Nations
AZEC:	Asia Zero Emission Community
CBAM:	carbon border adjustment mechanism
CCC:	Climate Change Commission (the Philippines)
CCER:	China Certified Emission Reduction
CJK:	China, Japan and the Republic of Korea
CNY:	Chinese yuan renminbi
CO_2e:	carbon dioxide equivalent
DCC:	Department of Climate Change (Viet Nam)
DCCE:	Department of Climate Change and Environment (Thailand)
DENR:	Department of Environment and Natural Resources (the Philippines)
DOE:	Department of Energy (the Philippines)
EAF:	electric arc furnace
EGAT:	Electricity Generating Authority of Thailand
ETP:	Southeast Asia Energy Transition Partnership
ETS:	emissions trading system
EU:	European Union
FOLU:	forestry and other land use
FY:	fiscal year
GHG:	greenhouse gas
GW:	gigawatt
GX:	Green Transformation (Japan)
GX-ETS:	Green Transformation Emissions Trading System (Japan)
HB:	House Bill (the Philippines)
HNX:	Hanoi Stock Exchange
ITMO:	internationally transferred mitigation outcome
JCM:	Joint Crediting Mechanism
JPY:	Japanese yen
K-ETS:	Republic of Korea Emissions Trading Scheme
KRW:	Korean won
LCEIA:	Low Carbon Economy Investment Act (the Philippines)
LULUCF:	land use, land-use change and forestry
MAE:	Ministry of Agriculture and Environment (Viet Nam)
MEE:	Ministry of Ecology and Environment (China)
MEMR:	Ministry of Energy and Mineral Resources (Indonesia)
METI:	Ministry of Economy, Trade and Industry (Japan)
MRV:	monitoring, reporting and verification
$MtCO_2e$:	million tonnes of carbon dioxide equivalent
NDC:	nationally determined contribution
NDC 3.0:	third generation of nationally determined contributions under the Paris Agreement
PHP:	Philippine peso
PLN:	PT Perusahaan Listrik Negara, the Indonesian state electricity utility
PPA:	power purchase agreement
PR:	Presidential Regulation (Indonesia)
RUPTL:	Rencana Usaha Penyediaan Tenaga Listrik, Electricity Supply Business Plan (Indonesia)
tCO_2:	tonnes of carbon dioxide
TGO:	Thailand Greenhouse Gas Management Organization
THB:	Thai baht
T-VER:	Thailand Voluntary Emission Reduction programme
UNFCCC:	United Nations Framework Convention on Climate Change

Glossary of Key Terms

Abatement: an action that reduces greenhouse-gas emissions, such as fuel switching, efficiency gains or carbon capture. The marginal abatement cost is the cost of reducing one additional tonne.

Absolute cap: a fixed ceiling on the total tonnes of emissions that covered entities may release in a period, regardless of output. Allowances issued equal the cap, so total emissions are guaranteed not to exceed it.

Additionality: the requirement that a reduction or removal of emissions behind a carbon credit would not have occurred without the revenue or incentive from that credit.

Allocation plan: the rules that set how many allowances each sector or entity receives, by what method (free allocation, benchmarking or auctioning) and over what period.

Allowance: a tradable permit under an emission trading system (ETS) that entitles the holder to emit one tonne of CO_2 or CO_2e. Covered entities must surrender allowances equal to their verified emissions.

Article 6: The Paris Agreement rules for voluntary international cooperation to help countries reach their climate targets, known as nationally determined contributions (NDCs). See Article 6.2 and 6.4 below.

Article 6.2: The Paris Agreement provision for bilateral or multilateral cooperative approaches. It enables countries to transfer mitigation outcomes (ITMOs) with authorisation and corresponding adjustments.

Article 6.4: The Paris Agreement Crediting Mechanism (PACM). This UN-supervised mechanism issues credits for approved projects. It succeeds the Clean Development Mechanism of the 1997 Kyoto Protocol.

Auctioning (paid allocation): selling allowances to covered entities through government auctions rather than giving them away. Auctioning strengthens the price signal and raises public revenue.

Banking and borrowing: banking lets entities carry unused allowances into later compliance periods; borrowing lets them use future allowances to meet current obligations. Both add flexibility but can weaken scarcity if unlimited.

Benchmarking: allocating free allowances based on an emissions-intensity standard per unit of output. It is often set at the performance of the most efficient installations in a sector.

Cap-and-trade: another name for an emissions trading system (ETS). In this system, the government sets a cap on emissions, issues allowances up to that cap and lets entities trade them.

Carbon border adjustment mechanism (CBAM): a charge on the embedded emissions of imported goods. It is designed to equalise carbon costs between domestic and foreign producers and limit carbon leakage. The European Union CBAM entered its definitive phase in January 2026.

Carbon credit (offset): a certificate representing the reduction or removal of one tonne of carbon dioxide equivalent (CO_2e) by a project outside the covered sectors. Credits can be used voluntarily or, within limits, for ETS compliance.

Carbon leakage: the shift of production, investment or emissions to jurisdictions with weaker climate policies in response to domestic carbon costs.

Carbon market: a market in which emission allowances or carbon credits are traded. It includes compliance markets created by regulation (such as an ETS) and voluntary markets where buyers purchase credits by choice.

Carbon neutrality: a state in which carbon dioxide (CO_2) emissions are balanced by CO_2 removals over a given period. Net zero usually refers to all greenhouse gases.

Carbon pricing: any policy that puts an explicit price on greenhouse-gas emissions, most commonly a carbon tax or an ETS. Its purpose is to make emitters bear the cost of emissions and shift investment toward low-carbon options.

Carbon sinks: natural or engineered reservoirs that absorb and store more carbon than they release, such as forests, soils, wetlands, oceans and geological storage sites.

Carbon tax: a fixed charge per tonne of CO_2e emitted or per unit of fossil fuel. It provides price certainty, but no guarantee, on the quantity of emissions reduced.

Compliance period: the time frame when covered entities must monitor emissions and surrender allowances, typically one year within a multi-year trading phase.

Corresponding adjustment: an accounting entry under Article 6 in which the host country adds transferred mitigation outcomes back to its emissions balance. This prevents the same reduction being counted by two countries.

Covered entity: a company or installation legally required to participate in an ETS or pay a carbon price because it falls within the defined sectors and thresholds.

Carbon dioxide equivalent (CO_2e): a common unit that expresses the warming impact of different greenhouse gases as an equivalent amount of CO2.

Double counting: claiming the same emissions reduction more than once, for example by both the host country and the buyer. It is prevented through registries and corresponding adjustments.

Emissions trading system (ETS): a market-based instrument in which a government sets a cap on emissions from covered sectors, issues allowances, and requires entities to surrender one allowance per tonne emitted. Entities can buy and sell allowances, creating a carbon price.

Free allocation: allowances distributed to covered entities at no cost, usually to ease the transition and protect trade-exposed sectors. The opportunity cost of using an allowance still exists, but generous free allocation weakens the price signal.

Grandfathering: a form of free allocation based on an entity's historical emissions. It is simple to implement, but it rewards past high emitters and offers little incentive to improve.

Intensity cap: a limit on emissions per unit of output (for example, tonnes of carbon dioxide (tCO_2) per megawatt-hour (MWh) or per tonne of steel). Total emissions can still rise if output grows, so an intensity cap does not guarantee an absolute reduction.

Internationally transferred mitigation outcome (ITMO): an emissions reduction or removal transferred between countries under Article 6.2.

Joint Crediting Mechanism (JCM): Japan's bilateral crediting scheme. Through the JCM, Japan supports low-carbon projects in partner countries, and the two countries share the resulting credits.

LULUCF or FOLU: land use, land-use change and forestry (LULUCF) or forestry and other land use (FOLU). The inventory sector covering emissions and removals from land and forests.

Market stability mechanism: rules that adjust allowance supply or prices to prevent extreme volatility, such as price floors and ceilings, allowance reserves or cost-containment releases.

Monitoring, reporting and verification (MRV): the system entities use to measure their emissions (monitoring), submit them to the regulator (reporting) and have them checked by an accredited independent body (verification). Robust MRV is the foundation of any carbon pricing instrument.

Nationally determined contribution (NDC): a country's climate pledge under the Paris Agreement, setting its emissions targets and actions. NDCs are updated every five years.

Permanence: the durability of an emissions removal or reduction. It is a key risk for nature-based credits, where stored carbon can be released by fire, logging or land-use change.

Registry: an electronic system that records the issuance, holding, transfer and surrender or retirement of allowances and credits.

Voluntary carbon market: a market where companies and individuals buy carbon credits by choice rather than to meet a legal obligation. They may do this, for example, to meet corporate climate targets.



OVERVIEW

A REGIONAL AGENDA FOR CREDIBLE CARBON PRICING

Author:
Ramnath Iyer, IEEFA

"Across the region, measurement, reporting and verification (MRV), institutional coordination and credible compliance systems remain critical areas of market development."

Section 1 - Introduction

Carbon pricing is developing across Asia, with economies at different stages of policy design, implementation and market development. This policy paper examines emissions trading systems and other carbon pricing mechanisms, assesses the experience of early movers China, Japan and the Republic of Korea and considers lessons for Southeast Asian economies establishing or expanding their own frameworks.

The Global Green Growth Institute (GGGI), the Institute for Energy Economics and Financial Analysis (IEEFA) and the Southeast Asia Energy Transition Partnership (UNOPS-ETP) have jointly developed this policy paper with the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). The paper draws on reviews of China, Japan, the Republic of Korea, Indonesia, Thailand, the Philippines and Viet Nam, and it studies the history of carbon policy development and the likely future market development based on current policy trajectories.

The paper sets out shared solutions for East and Southeast Asian economies and offers policies suited to the region's political economy, including higher carbon prices and flexible cap design. In addition, it analyses the effects of the European Union (EU) Carbon Border Adjustment Mechanism (CBAM) and explores how governments can build demand for high-integrity carbon credits. Country findings were tested through workshops and consultations with government officials, regulators, exchange and registry operators, utilities, industry, financial institutions, developers and researchers. Responses and feedback were used to shape final recommendations and ground them in the national context. Further, research and recommendations were shaped by the review of GGGI's carbon finance experts and the Expert Working Group (EWG) – an international group of leading experts on carbon markets and economics convened by GGGI to share best practice from across the globe. EWG members attended consultation workshops and provided direct review of the policy paper chapters. Finally, findings and recommendations were shaped by dialogues amongst high-level policymakers, industry leaders and sector practitioners at the World Economic Forum Decarbonization and Circularity for Industrial Growth and Competitiveness Dialogue, the 2026 Asia Carbon Pricing Forum and the 16th Asia-Pacific Carbon Markets Roundtable, which were supported by GGGI. The policy paper's findings will inform the Diagnostic and Roadmap reports in 2027.

Emissions trading system design and implementation

Carbon prices, emissions coverage and institutional capacity influence how emissions trading systems (ETS) function. In several of the analysed Asian systems, low prices, generous free allocation and allowance oversupply create constraints. These experiences provide a basis for examining how allocation rules, cap design, market participation and governance affect implementation. In addition, the implications for investment and power-sector decarbonisation are also considered, recognising that outcomes depend on market conditions and complementary policies.

Insights from the experiences of China, Japan and Republic of Korea

Southeast Asian economies face distinct implementation challenges as they establish compliance mechanisms. Early regional experience illustrates the difficulties of developing trading liquidity, transparent pricing and robust governance arrangements after launch. Across the region, measurement, reporting and verification (MRV), institutional coordination and credible compliance systems remain critical areas of market development.

The experience of China, Japan and the Republic of Korea (CJK) can inform the choice of emission trading system features, while taking account of the differences in economic structures, regulatory capacity and policy priorities.

Section 2 - Emerging policy and design priorities and recommendations

Existing carbon pricing systems across Southeast Asia show weak price signals, narrow sectoral reach and still-developing institutional frameworks. Several states are assessing emissions-trading schemes, carbon taxes and voluntary carbon markets. However, essential elements, such as sound MRV systems, suitable allocation methods and open market oversight, are still being put in place. Carbon pricing in Southeast Asia therefore remains at an initial stage of development. Reinforcing these early systems needs firm official and social support and can benefit from knowledge and insights from more experienced states.

Over the past decade, the Northeast Asian CJK economies (China, Japan, Republic of Korea – CJK) have tested varied methods for allowance trading, sectoral reach, market oversight and MRV. Since 2013, China has followed a staged, regionally trialled approach to test allocation, MRV, registries and trading rules in different regional settings. Republic of Korea has gone through four phases of allocations, fine tuning, tightening and analysing methods, such as auctioning based on assessment of ETS performance. Japan, meanwhile, has raised financing for emerging industries and carbon pricing systems in an innovative way.

Drawing on the experiences of China, Japan and Republic of Korea and the priorities of Viet Nam, the Philippines, Indonesia and Thailand, this paper identifies potential areas for policy development and regional cooperation. CJK's experiences in large-scale market development, ETS implementation and reform and integrated transition policies offer valuable lessons for Southeast Asia, while the challenges they have faced create opportunities for mutual learning and market improvement across the region. Southeast Asia's growing energy and industrial investment needs, together with the need for Republic of Korea and Japan to secure international mitigation outcomes towards their 2030 targets, provide further incentives to build on existing bilateral partnerships and explore more coordinated regional cooperation.

Accordingly, the following recommendations distinguish immediate priorities for enhancing institutional readiness and practical knowledge sharing from subsequent measures for market deepening and transition investment, with the aim of strengthening domestic carbon pricing and regional cooperation.

Potential steps and recommendations for CJK-Southeast Asia cooperation and carbon pricing strengthening

Building skill and capability capacity based on regional experiences. Carbon pricing systems and their effective administration are relatively new to many member states, so there is a need to build the skillsets and systems to operate them in line with the national objectives they are intended for. In order to meet decarbonisation objectives, these systems depend on reliable facility- and enterprise-level data. Consequently, sharing the technologies and skills that improve data generation and interpretation and that facilitate reporting and monitoring can help reduce the learning period. Similarly, the CJK's experience formulating plans that link financing to emission pathways, determining scope and sectoral coverage, and conducting effective simulations can help accelerate the learning curve for other member states.

Harmonising regional registries, verifier standards and credit-integrity thresholds. In the initial stages of implementation, CJK-Southeast Asia cooperation could focus on compatible registries, accounting formats, verifier standards and strict minimum credit-integrity rules on additionality, ownership and double counting. This strengthens domestic compliance and voluntary markets and supports Article 6 transfers against quantified national mitigation budgets.

Building foundational facility-level MRV and compliance readiness. Mandatory facility emissions reporting, third-party verifier accreditation, registry testing and simulated compliance need to be established. CJK's reporting, verification and digital archiving practices can be used to inform this process. Near-term priorities include closing Viet Nam's MRV gaps for the period from 2027 to 2028, expanding Indonesian reporting to captive coal and industry, and using Thailand's data collection from 2027 to 2028 to build verified baselines. Reporting systems should also be developed that are designed for data interoperability and future expansion to product-level carbon accounting, including requirements associated with the EU CBAM.

Publishing multi-year sectoral carbon budgets aligned with national climate targets. Before binding compliance begins, multi-year sector allowance budgets, annual allowance quantities and adjustment rules should be published. Republic of Korea's NDC-aligned cap method provides a practical model to be followed. These sector budgets should be connected to facility readiness assessments, legal unit classifications and clear institutional mandates across agencies.

Calibrating scarcity rules and sequencing the deployment of carbon charges and ETS. Calibrating free allocation, offset ceilings, banking limits and electricity tariffs across the system - can help ensure that excess flexibility does not weaken price formation. In Viet Nam and Indonesia, there is a need to restore predictable allocations and tighten power benchmarks; In the Philippines, an initial carbon charge on large emitters would help prepare for a future ETS and also enable the domestic MRV industry to develop; and in Thailand, aligning fuel taxes, carbon taxes and the ETS would streamline the overall carbon pricing structure.

Earmarking carbon revenues and aligning transition finance and infrastructure delivery. Carbon tax and auction revenues should be recycled and directed toward industrial decarbonisation, grid infrastructure, vulnerable household social protection transfers and market administration. However, budgeting and allocation should foresee receipts will decline as emissions fall. Before high-emissions assets are locked in, carbon pricing should be paired with transition finance, grid delivery and low-carbon procurement, as in Japan and Republic of Korea.

Benchmarking allocation, phasing in auctioning and conducting product-level CBAM accounting. For those sectors that are emissions-intensive and trade-exposed, combining benchmark-based free allocation with modest auctioning to establish verified domestic carbon payments is useful. Interim grandfathering can be phased down as data improves. Also, product-level emissions accounting in steel and aluminium can be accelerated to help exporters document payments and manage EU CBAM liabilities.

Structuring an effective market design with price corridors and market stability reserves, backed by joint impact modelling. Drawing on Japan's Green Transformation Emissions Trading System (GX-ETS) reference prices, member states should aim for a published, progressively rising price corridor, alongside defined banking limits, vintage rules and a market stability reserve. This will balance cost predictability with long-term abatement signals. Partnering with CJK institutions on simulations and economic and distributional modelling across power dispatch, industrial competitiveness and household tariffs would enable policymakers to preview the likely outcomes of various design choices.

"Governments have generally prioritised competitiveness and energy security over tighter allowance supply and stronger carbon prices."

Section 3 - Carbon pricing history in Asia: two waves of development

Asia's carbon markets have developed in two waves, with reporting and voluntary participation generally preceding mandatory obligations. China, Japan and Republic of Korea were among the first movers in the region. Republic of Korea launched its emissions trading system in 2015 after introducing mandatory targets for large emitters in 2012. China tested subnational markets from 2013 before establishing a national scheme covering the power sector in 2021. In 2025, it expanded to include steel, cement and aluminium. Although Japan did not introduce its mandatory ETS until last year, it has had mandatory emissions reporting system and international crediting programmes in place since 2006. As a result, Japan designed the ETS as part of a broader package integrating carbon pricing with energy and industrial transition policies.

The other member states in Southeast Asia started later. Indonesia launched its mandatory power-sector ETS in 2023. Viet Nam established its legal framework in 2025 and opened an exchange in June 2026. Thailand has voluntary schemes and a carbon tax, but its Climate Change Act, which includes proposals for an ETS and an imports carbon border adjustment tax (a 'Thailand CBAM'), remains pending. The Philippines still relies on voluntary projects, and legislation has been proposed, but it has not yet been adopted.

These later starters face pressure to move faster, which tests their institutional capacity. Moreover, from the onset, their systems have been shaped by the EU's Carbon Border Adjustment Mechanism and Paris Agreement Article 6 credit markets. However, as these member states ramp up their systems, they can also take advantage of the lessons learned from CJK's experience. Both these pressures and the insights from the CJK's experiences can help shorten the path from voluntary participation to mandatory compliance.

Shared features across the region: compliance before ambition

Governments have generally prioritised competitiveness and energy security over tighter allowance supply and stronger carbon prices. Free allocation, allowances linked to output or historical emissions, and access to offsets have limited costs for industry, but they have also weakened incentives to decarbonise. Tightening of emission allocations has progressed at an uneven pace.

Abundant availability of allowances can turn an initial start-up feature into a persistent design risk. Output-linked allocation in China and Japan has protected production, while Viet Nam's reliance on historical emissions risks locking in generous allowances. Indonesia's intensity benchmarks produced prices of just US$ 0.60 to US$ 1.70 per metric tonne in 2024.

In addition to problems caused by the overabundance of allowances, power-sector regulation further blunts the price signal. Regulated tariffs constrain cost pass-through, and coal capacity continues to expand in China, Viet Nam and Indonesia. Carbon pricing cannot carry the transition if electricity regulation and investment policy pull in the opposite direction. Concomitant grid investments, clean-power procurement and industrial finance should reinforce the carbon signal.

Clear tightening schedules and stronger links to national emissions targets position CJK well to convert their experience into measurable reductions. They now can and should aim to pursue more ambitious mitigation objectives, drawing on years of reporting, market development and implementation experience.

Differences: caps, certainty, finance and credits

The most consequential distinction between China, Japan, and Republic of Korea is the different approaches to an emissions cap. Republic of Korea adopted an absolute cap from the start. Although this did not prevent surplus allowances and low prices, it gave policymakers a defined quantity to tighten. A 16.8 per cent reduction in the Phase 4 cap, alongside a market stability reserve, helped strengthen prices. China and Japan, on the other hand, determine allowance supply from the bottom up, making tightening more dependent on administrative decisions. China is contemplating a move towards absolute caps in some sectors, while Japan has not yet quantified the GX-ETS contribution to its national climate target.

Although later starters should establish credible cap trajectories, if not numerical caps, before allocation practices become entrenched, progress has been uneven. Viet Nam, for example, targets an emissions peak in 2035, but the Philippines' national commitment specifies neither a cap nor a peaking year. Approaches to continuity and legal certainty also differ. Republic of Korea's phased, legislated framework has enabled adjustments without interruption. However, in Indonesia, allocation was suspended during regulatory revisions in 2025. This shows that trading infrastructure alone cannot sustain compliance demand. In Viet Nam, the unresolved legal treatment of allowances limits their bankability; whereas in both Thailand and the Philippines, enabling legislation has not yet been implemented. Offset ceilings also range widely from 5 per cent in China and Republic of Korea to 30 per cent in Viet Nam.

Fiscal capacities also differ and can make a material difference. Japan supports its transition with about JPY 20 trillion in transition bonds, while Republic of Korea has introduced transition loans and facility support. The CJK countries, with their larger economies, can back their carbon systems with funding for decarbonisation or related investments. The other Southeast Asian member states, on the other hand, do not have this luxury. For example, Thailand's estimated THB 5 trillion investment requirement dwarfs its proposed climate fund's early revenue. As a result, the other member states in the region are more likely to require external finance and crediting, making Article 6 rules central to market design.

The two groups will likely approach the international carbon credit markets differently. Republic of Korea expects international mitigation to contribute 12.8 per cent of its 2030 pathway; Thailand and the Philippines are potential suppliers. These higher overseas prices could draw away high-quality credits needed by the latter group for domestic targets. International sales should therefore be carefully measured against quantified national mitigation budgets before being authorised so that they are not treated as unrestricted export opportunities.

"Carbon pricing cannot carry the transition if electricity regulation and investment policy pull in the opposite direction."

Section 4 - Salient issues and insights

The CJK's experiences span the full arc of market development, including emissions accounting, pilot programmes, mandatory trading, allocation reform, auctioning, banking controls, transition finance and market-stability mechanisms.

For the other Southeast Asian member states, the most critical need is establishing a reliable system of facility-level MRV, combined with multi-year carbon budgets that link covered sectors to national climate targets. Introductory cost-containment tools, phased auctioning alongside benchmarked free allocation, disciplined banking and offset limits, and clear sequencing between carbon taxes and emissions trading are essential to preserve market scarcity and price credibility. At the regional level, aligning registry standards, credit-integrity thresholds and product-level carbon accounting offers interoperability between systems and practical avenues for cooperation between States, while still accommodating national policy priorities and carbon revenue needs.

Carbon budgets and sector coverage

An effective carbon market and emissions pricing system requires coordination and a defined relationship between national climate targets, sectoral emissions pathways and the allowances issued to covered facilities. Consultations have also highlighted two connected issues: selecting sectors for initial coverage and translating national targets into facility obligations.

Republic of Korea provides the most developed regional example of this alignment; its Phase 4 ETS sets an absolute cap aligned with its 2030 NDC pathway, 16.8 per cent below the Phase 3 cap. In China and Japan, by contrast, allocation remains substantially linked to output, company targets or verified emissions, which supports gradual participation but provides less certainty over aggregate emissions.

The practical implication is that early sector selection by itself cannot compensate for an unambitious carbon budget. Sectors such as power, cement and steel are good starting points because emissions are concentrated and accounting methods are relatively established. Those could be followed by the refining and aluminium sectors if facility data and administrative capacity are sufficient. Broad coverage with allowances close to business-as-usual emissions, however, creates limited scarcity, as seen in the early stages of China's system and Indonesia's power-sector ETS.

A rolling five-year carbon budget for covered sectors is recommended in each member state. This would include annual allowance quantities, provisions for new entrants, plant-closure treatment and adjustment criteria for significant economic or technological changes. A reserve for data uncertainty could be included within the budget.

Budget precision can be expected to improve over time. While initial estimates may use conservative fuel-based calculations, as MRV improves, these can transition to verified installation data and sector benchmarks. Republic of Korea's pre-ETS Target Management System allowed facilities to gain mandatory reporting and compliance experience before trading began, creating familiarity with the concepts, calculations and implications of participating in an ETS. Starting early, and improving precision over time, is relevant to the Philippines and Thailand, where facility baselines remain a priority, and to Indonesia's industrial expansion, where delayed coverage could lock in emissions before a long-term constraint is established.

Monitoring, reporting and verification

Reliable facility-level MRV underpins allocation, compliance and sector expansion. Establishing reporting obligations before trading allows facilities and regulators to build emissions records, verification procedures and review capacity. China, Japan and Republic of Korea used different mechanisms to accomplish this. China relied on enterprise level reporting, third-party verification, regulatory review and monthly digital archiving of key data; Japan used corporate emissions reporting and digital allowance-account management; and Republic of Korea did this through its Target Management System.

The immediate task across the four Southeast Asian member states is to improve data consistency and verification capacity. In Viet Nam, only 12 of 91 installations surveyed in 2026 had stable MRV systems ahead of third-party verification requirements for the 2027 to 2028 allocation period. Thailand's voluntary-market experience offers a starting point for expanding verifier capacity, while Indonesia could coordinate power and industrial emission calculations through links to its SIINas industrial reporting system.

Capacity-building is best focused on facility inventories, monitoring plans, data-quality controls, verifier accreditation and regulatory audits. Practical secondments and joint verification exercises offer more direct implementation support than general policy workshops. Where data remain incomplete, audited fuel consumption with standard emission factors can provide interim estimates under conservative assumptions, independent checks and a fixed transition timetable. Industrial process emissions will require separate accounting alongside production and material-flow data as coverage expands.

Cost containment and impact assessment

Electricity tariffs, industrial competitiveness and investments with limited near-term abatement options make carbon-pricing costs and maximum compliance liability a major policy concern. While China, Japan and Republic of Korea use allocation, price management and compliance flexibility to contain costs, excessive reliance on these tools weakens scarcity and delays investment signals. Japan's GX-ETS provides the most directly applicable price-management reference, using an upper reference price for settling allowance shortfalls and a lower reference price for market intervention, both set to rise annually.

A published, progressively rising price ceiling is recommended for the first three to five years of Southeast Asian compliance markets. The ceiling can operate through a limited release of allowances from a reserve within the cap, with units supplied at the ceiling deducted from future budgets to preserve the cumulative constraint. Publishing these rules several years in advance helps companies incorporate carbon costs into operating plans and investment appraisal.

ETS design needs to reflect national electricity and tax structures, whether coal-heavy generation with high electricity prices (the Philippines), regulated tariffs and state influence over cost pass-through (Indonesia and Viet Nam), or the interaction between a carbon tax and an ETS (Thailand). Republic of Korea illustrates how regulated retail tariffs can mute the carbon-cost signal reaching consumers even as auctioning raises power generation costs, weakening the demand-side response and pressuring utility finances. Southeast Asian frameworks should therefore ideally try and address tariff treatment, generator compensation and targeted household protection together.

Supporting country-specific analysis will require models that link disparate but connected aspects - energy-system, macroeconomic and household-distribution - in order to estimate impacts on power dispatch, consumer tariffs, industrial output, trade exposure, household expenditure and public revenue. Scenarios can test alternative caps, tax rates, auction shares, offset limits, banking rules and revenue-recycling packages. CJK institutions can provide technical cooperation on model specification, data treatment and scenario review.

Allowance allocation and auctioning

Emissions performance improves when allocation design balances initial cost protection with allowance scarcity and abatement incentives. China, Japan and Republic of Korea have relied initially on free allocation while phasing in auctioning: Republic of Korea began with full free allocation and is increasing power-sector auctioning from 15 per cent in 2026 to 50 per cent in 2030 while maintaining free allocation for leakage-exposed industries; Japan plans power-sector auctions from financial year 2033; and China envisages combined free and auctioned allocation by 2030.

A modest auction share is recommended during the first binding phase in Southeast Asia. This should start with power generation - where tariff and market arrangements can allow carbon costs to influence dispatch and investment - alongside benchmark-based free allocation for emissions-intensive, trade-exposed sectors. While grandfathering can provide a transitional basis if production and emissions data are incomplete, it risks preserving historical inefficiencies and over-allocation. A hybrid approach could combine benchmarks in sectors where activity data are reliable with declining grandfathered allocation and temporary fuel-based formulas for selected combustion sources.

Banking, market stability and voluntary carbon market integration

Banking rules, market-stability mechanisms and offset limits jointly govern compliance flexibility and allowance scarcity. The experience of Republic of Korea shows that banking, when combined with expectations of tighter future supply, can encourage hoarding. This reduces liquidity, prompting banking limits linked to net sales and periodic revisions. China similarly restricts older allowance vintages to prevent accumulated surpluses from swamping later compliance periods.

Southeast Asian systems are encouraged to permit banking within a compliance phase subject to quantitative limits and clear vintage rules announced before allocation, while restricting borrowing tightly because it defers current obligations and delays emissions reductions. A market stability reserve can address exceptional surpluses or shortages by initially combining price triggers with quantity indicators such as cumulative surplus, auction demand, verified emissions and banking levels. In addition, it should specify intervention volumes, allowance sources, treatment of withdrawn units and annual disclosure.

"While differing national caps, prices and legal systems make full market linkage a longer-term prospect, compatible registries and common integrity standards offer an immediate basis for regional cooperation."

These supply controls must be calibrated with voluntary carbon market (VCM) offset rules. Across the four Southeast Asian member states, voluntary markets have developed ahead of binding constraints: Thailand has over a decade of voluntary carbon market experience through its Thailand Voluntary Emission Reduction Program (T-VER) and an operational registry. Indonesia has opened domestic credits to international trading. The Philippines has separate forest and energy credit frameworks; and Viet Nam has established rules for domestic credits and international transfers. These initiatives have helped build methodologies and institutional experience. However, demand, issuance and secondary trading remain uneven. An ETS can strengthen VCM integrity through consistent facility reporting, verifier accreditation, a national registry that tracks both ownership and serial numbers, and selective compliance eligibility.

However, excessive offset limits or loose flexibility provisions risk transferring voluntary market oversupply into the compliance market and eroding allowance scarcity. For this reason, China and Republic of Korea cap offset use at 5 per cent of compliance obligations; whereas Japan permits J-Credits and Joint Crediting Mechanism (JCM) credits up to a combined 10 per cent of actual annual emissions during financial year 2026 to financial year 2030. Against these benchmarks, Southeast Asian rules warrant review before full operation or relaunch: Thailand is considering an offset limit of up to 15 per cent (which could absorb thin, oversupplied T-VER credits while muting introductory allowance demand). Indonesia's original power-sector rules imposed no quantitative offset limit, while Viet Nam combines a 30 per cent offset limit with unlimited banking and 15 per cent borrowing.

Registry compatibility and regional integrity standards

While differing national caps, prices and legal systems make full market linkage a longer-term prospect, compatible registries and common integrity standards offer an immediate basis for regional cooperation. Building on the Association of Southeast Asian Nations (ASEAN) Common Carbon Framework and Thailand's registry and Article 6 experience, Indonesia, Viet Nam, the Philippines and Thailand can align registry data fields, serial-number conventions, unit identification, ownership, vintage, methodology, location, authorisation, corresponding adjustments and transaction status, audit trails and public reporting.

Initial cooperation could focus on traceability, accredited verifiers, selected methodologies and minimum thresholds for additionality. There is also room for cooperation on steps to develop conservative baselines and rules on permanence, prevention of leakage, and double issuance across domestic, voluntary and Article 6 systems. This would allow each member state to retain sovereign control over domestic compliance eligibility and set their own quantitative preferences, while at the same time, support cross-border credit recognition and interoperability.

CBAM and carbon pricing

The European Union's Carbon Border Adjustment Mechanism (CBAM) strengthens the commercial case for carbon pricing in Southeast Asia, even beyond the immediate current export exposure in Indonesian, Vietnamese and Thai iron, steel and aluminium. CBAM allows deductions only for carbon prices effectively paid in the country of origin. It both excludes free allocations and adjusts for rebates or compensation. As a result, neither the fully free pilot allocation in Viet Nam nor the current power-focused ETS in Indonesia generates material deductible payments for steel or aluminium exporters. Introducing a modest auction share or carbon tax in trade-exposed sectors would help retain carbon value domestically while generating revenue for transition support.

Such a change requires domestic consultation and careful calibration. If a carbon price was introduced solely to match an external border measure, it could impose production costs on materials sold in other markets without providing adequate decarbonisation options. A stronger rationale would ideally combine carbon pricing with CBAM readiness and domestic objectives, such as lower product carbon intensity, better investment environment for low carbon technologies and a credible long-term signal for new industrial capacity.

An immediate priority is bridging the gap between facility-level ETS inventories and CBAM's product-level accounting of embedded and precursor emissions. The experience of Republic of Korea with product-level accounting requirements and Japanese CBAM calculation guidance creates opportunities for technical cooperation to enhance understanding of such product level accounting requirements.

Carbon revenue use

CJK experience demonstrates how carbon pricing revenues and transition finance can overcome investment barriers: Japan is issuing approximately JPY 20 trillion in GX Economy Transition Bonds that are to be repaid from future fossil-fuel levies and power-sector auctions; Republic of Korea pairs capital support and transition finance with demand-creation measures for low-carbon products, and China is planning a shift toward paid allocation that will create new transition funding.

In Southeast Asia, four revenue uses merit explicit provision: industrial decarbonisation (by financing new commercial-scale projects where carbon prices remain below abatement costs), creation of enabling infrastructure (by upgrading the grid and storage), targeted social protection (by shielding low-income households without suppressing price signals) and carbon-market administration (through MRV, registry operation and enforcement). Allocations of revenues will reflect national priorities. For example, the Philippines can channel auction or tax proceeds into its lifeline electricity programme, targeted cash transfers and grid and off-grid investment; Thailand can use its proposed National Climate Fund to direct auction and border-adjustment revenue toward mitigation, adaptation and research; and Viet Nam and Indonesia can prioritise grid integration, MRV, industrial transition and support for affected workers and regions under transparent selection criteria.

While routing some funds through the general budget can leverage established public-finance controls, setting a defined minimum allocation for transition and household measures preserves public visibility over the purpose of carbon pricing. This should be backed by annual disclosure of revenues, administrative costs, beneficiaries, private capital mobilised and verified emissions reductions. As the long-term bond model highlights, governments must account for declining carbon receipts as taxable emissions fall and avoid making permanent expenditure commitments based on erroneous assumptions of perpetually rising carbon revenues.

Carbon charge or tax and ETS sequencing

Instrument sequencing ideally should reflect each member state's institutional and data readiness. The Philippines, for instance, has a strong case for starting with an upstream fossil-fuel carbon charge or a temporary tax while the complex issues that need to be resolved in the current ETS proposals get clarified. Decisions must be made on absolute caps, allocation, offset limits, banking, registry governance as well as facilities emissions data and carbon rights legislation, among others. Given these challenges, a temporary upstream fossil-fuel tax would use existing tax and fuel-supply systems and provide predictable costs. It would cover diffuse emissions more efficiently than facility trading, and it could begin at a low rate with scheduled increases. Over time, with verified reporting, benchmarking and simulated compliance, transitioning into a declining-cap ETS, with clear rules governing tax deductibility or a tax-based price floor, should be possible.

By contrast, Viet Nam and Indonesia already have operational ETS frameworks and should prioritise allowance scarcity, verification and compliance continuity rather than replacing trading with a tax. Thailand can retain its existing fuel levy alongside a narrow ETS for concentrated power and industrial emissions, defining clear coverage and deductibility rules where fuel taxation and facility trading coexist. Despite each member state's particular context, sequencing across all four member states should maintain a unified national emissions-accounting framework, an authoritative single registry, and consistent rules governing voluntary credits, compliance units and international transfers.

"Governments must… avoid making permanent expenditure commitments based on erroneous assumptions of perpetually rising carbon revenues."



CHINA

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1. Key messages

China's carbon market has achieved scale and compliance; credible allowance scarcity is the next test. The national emissions trading system (CN-ETS) covers more than 60 per cent of national carbon dioxide (CO_2) emissions, with 99.9 per cent compliance for 2024. However, output-linked free allocation, deficit protections and surpluses eligible for future compliance weaken abatement incentives.

Offset integrity supports both cost containment and international credibility. Aligning China Certified Emission Reductions (CCER) rules and methodologies with international integrity standards, such as the Core Carbon Principles, would ensure offsets deliver real domestic emissions reductions and strengthen global credibility.

Carbon pricing must inform enterprise decisions and support industrial transformation. Predictable carbon costs, effective pass-through of those costs in electricity markets and stronger carbon management capacity within enterprises are essential. Auction revenue and complementary standards, procurement and finance can support investments that the ETS alone cannot deliver.

The EU Carbon Border Adjustment Mechanism (CBAM) strengthens the case for cleaner production, credible carbon accounting and domestic ETS reform. The European Union CBAM affects export competitiveness. It increases the value of verified emissions data and documented carbon payments. Tighter allocation and phased auctioning can support China's transition and generate domestic revenue; eligible payments may reduce CBAM liabilities, but deductions depend on accounting boundaries, free allocation and compensation.

Regional cooperation should combine mutual learning with practical implementation support. China's experience should be adapted to local institutions. Country-led diagnostics, technical exchanges and compatible emissions accounting and registry practices can strengthen national systems. Credit recognition and market linkage remain longer-term options requiring separate agreements and safeguards.

"Carbon pricing must inform enterprise decisions and support industrial transformation."

2. Context and baseline

China's latest Biennial Transparency Report records 14.3 gigatonnes of carbon dioxide equivalent ($GtCO_2e$) of greenhouse-gas emissions in 2021, excluding land use, land-use change and forestry (LULUCF), with CO_2 accounting for 81.2 per cent. Energy contributed 76.9 per cent, and industrial processes and product use made up 14.9 per cent of gross emissions. Core hard-to-abate industrial sources — steel, cement, aluminium smelting, chemicals and other mineral and metal production — emitted about 4.6 $GtCO_2e$, which accounted for 32 per cent of the total emissions. [1] In 2025, the national emission trading system (CN-ETS) expanded to include steel, cement and aluminium smelting. This added approximately 3 $GtCO_2e$ of annual emissions to its coverage. [2]

The CN-ETS supports China's goals of peaking CO_2 emissions before 2030 and achieving carbon neutrality before 2060. China is pursuing these goals through a policy framework combining Five-Year Plans, which set national development targets, industrial regulation and administrative controls on total carbon emissions and intensity. China's 2035 nationally determined contribution (NDC) adds an economy-wide target to reduce net greenhouse-gas emissions by 7 to 10 per cent below peak levels. [3]

The 2024 Interim Regulations established a State Council-level framework for carbon trading, including stronger penalties for non-compliance and data fabrication. [4] The Ecological Environment Code, which consolidates China's environmental laws into a single code and took effect on 15 August 2026, incorporates a dedicated chapter on climate change. [5]

China's energy system remains carbon intensive despite rapid renewable expansion. Coal supplied 51.4 per cent of total energy consumption in 2025. Wind and solar together represented 47.3 per cent of installed electricity-generation capacity, whereas thermal power was 39.6 per cent. [6, 7] China's 2035 NDC targets a non-fossil energy share of over 30 per cent of total energy consumption. Its goal is for wind and solar capacity to exceed six times the 2020 level and reach 3,600 GW, and for ETS to expand and cover all major high-emitting sectors. [3]

As the region's anchor market, China's national ETS provides a basis for cooperation on emissions trading and carbon crediting among China, Japan, the Republic of Korea (CJK) and Southeast Asia, while its implementation challenges create opportunities for reciprocal learning.

3. State of the emissions trading system and the carbon market

Coverage and cap

In 2025, the CN-ETS covered four sectors, 3,378 entities and approximately 8 $GtCO_2e$. This represented more than 60 per cent of national CO_2 emissions. [8, 9] Eight subnational pilots covered additional sectors and tested reforms that can inform national policy; the central government has ruled out new local or regional ETSs. [10]

China's ETS does not yet operate under a fixed absolute cap. Instead, the total volume of allowances is determined ex post through sector-specific rules. For example, in the power sector, it varies with actual electricity and heat output and emissions-intensity benchmarks for four-unit groups: larger and smaller conventional coal units, unconventional coal units and gas units. In the steel, cement and aluminium smelting sectors, allowance is closely tied to verified emissions for the compliance year. [11, 12]

Allocation

Allowances are issued free under sector-specific plans, often covering two years. [11, 12] The September 2026 plan sets provisional allocation, for the power sector for the period from 2025 to 2026 and for steel, cement and aluminium smelting in 2026, at 50 per cent of each entity's verified emissions in the preceding year. Power previously received 70 per cent. Provinces may lower this share to reflect production conditions or compliance risks. [12] A separate plan governs industrial allocation for 2025. Once emissions are verified, allowances are adjusted to each entity's final entitlement. [11, 12]

MRV and market infrastructure

Monitoring, reporting and verification (MRV) combines enterprise emissions reporting, third-party verification and regulatory review. Monthly digital archiving of key accounting data strengthens traceability between annual reporting cycles. The expansion into steel, cement and aluminium smelting in 2025 has increased accounting complexity, particularly for clinker process emissions and aluminium perfluorocarbon emissions. Reliable implementation therefore requires enterprise data-quality control plans, traceable records and sector-specific verifier expertise. [11]

The national allowance registry and clearing infrastructure operate in Wuhan, while allowance trading takes place on the Shanghai Environment and Energy Exchange. Together, these systems link verified emissions with allowance ownership, trading, settlement and surrender. This supports both compliance and market oversight.

Compliance

Compliance follows an annual cycle. For the 2024 emissions year, surrender obligations totalled 8.19 billion tonnes, with approximately 99.9 per cent fulfilled in 2025. [9] This demonstrates strong compliance administration; it does not, however, by itself, establish emissions reductions.

Transitional protections limit allowance shortfalls. Power-sector deficits cannot exceed 20 per cent of verified emissions, and gas-unit deficits are fully covered by additional free allowances. This eliminates gas units' allowance-purchase incentive while the exemption binds, although surplus units can still benefit from selling unused allowances. [11, 12] Industrial allocation equalled verified emissions in 2024 and may deviate by no more than 3 per cent in 2025 and 2026; thereby, limiting surpluses and shortfalls. [12, 13]

Price signal and liquidity

In 2025, the average allowance transaction price was CNY 62.36 per tCO_2, and the year-end closing price was CNY 74.63 per tCO_2, about 23 per cent below the 2024 closing price of CNY 97.49 per tCO_2. [14] However, output-linked free allocation, deficit protections and surpluses that can be banked for future compliance weaken abatement incentives.

In 2025, annual trading reached 235 million tonnes, worth CNY 14.63 billion. Since the market began in July 2021, cumulative trading has reached 865 million tonnes and CNY 57.66 billion. [9] However, trading remains concentrated around compliance deadlines, which limits continuous price discovery. [14]

Earlier rules permitted restricted conversion of allowances from 2019 to 2024 into the 2025 vintage. Under the September 2026 plan, however, 2019–2024 allowances can be used only for those years' obligations; allowances from 2025 to 2026 can cover those and subsequent years, subject to applicable rules. [12, 15]

CCER

China Certified Emission Reductions (CCERs) connect the national voluntary crediting mechanism with ETS compliance. Eligible credits can meet up to 5 per cent of the surrender obligation of covered entities. [15] The voluntary market operates separately. The National Center for Climate Change Strategy and International Cooperation administers registration, while trading is conducted through the Beijing Green Exchange.

In contrast to allowance trading, the offset market remains small. Covered entities may use CCER, credits from verified mitigation projects outside the ETS, for up to 5 per cent of their verified emissions. However, because most allowances are allocated free, firms need offsets only to cover small shortfalls, and few credits are available even for that. By the end of 2025, there were 7.76 million tonnes of registered reductions and 9.22 million tonnes traded. [9, 16, 17] CCERs will therefore add meaningful compliance flexibility only if more projects are registered and allowances become scarcer.

Credibility requires additionality, robust quantification, independent verification and safeguards against double counting and reversals. Alignment with international benchmarks, including Integrity Council for the Voluntary Carbon Market's (ICVCM) Core Carbon Principles, would strengthen domestic and international confidence. [18]

Reform trajectory

In August 2025, China's central government issued a policy document on strengthening the national carbon market. [10] It envisages coverage of the main industrial emitting sectors by 2027, with allowance caps prioritised for sectors with relatively stable emissions. By 2030, it foresees a market based on total allowance control and combined free and paid allocation. It also provides for allowance reserves, market-adjustment mechanisms and the gradual admission of qualified financial institutions and other non-compliance participants. [10]

Steel, cement and aluminium smelting are in an implementation phase from 2024 to 2026. From 2027 onwards, allocation will be benchmarked against advanced industry performance, and the Ministry of Ecology and Environment (MEE) will study a mechanism for progressively tightening sectoral allowance totals. [2] The MEE also plans to raise the share of paid allocation over time. [13]

The strength of the investment signal will depend on how these objectives are implemented through sectoral cap trajectories, allocation rules, the share of paid-allocation and market-stability arrangements. Predictable tightening, reliable verification and coordination with electricity and industrial policy will determine the market's contribution to emissions reductions and industrial investment.

4. Industrial decarbonisation and energy transition linkages

Sector-specific abatement opportunities

After power generation, steel, cement and aluminium smelting are among the largest industrial emitters. These sectors were brought under the ETS in 2025. Unlike power generators, which can replace coal with cleaner sources, these industries cannot cut emissions deeply without changing their manner of production.

In cement, approximately two thirds of the direct CO_2 emissions from conventional clinker production arise from limestone calcination. Energy efficiency and fuel switching therefore address only part of the problem. Deeper reductions require lower clinker content in cement, material efficiency, alternative raw materials and binders, and carbon capture and storage (CCS), although CCS has yet to be proven at commercial scale and remains costly. [19]

In steel, scrap-based electric arc furnace production offers a mature route to lower emissions, particularly when supplied with low-carbon electricity. Its expansion depends on scrap availability, quality and cost alongside electricity prices. For primary steel production, hydrogen-based direct reduction and carbon capture, utilisation and storage (CCUS) offer further options, but both remain at an early stage of deployment and require supporting energy supplies, infrastructure and investment. [20]

In aluminium smelting, electricity supply dominates the overall emissions footprint. However, the smelter's ETS obligation covers only direct emissions, not those from the electricity it consumes. Instead, the power plants supplying that electricity, including captive plants that meet ETS coverage criteria, face separate power-sector obligations. [11] Cleaner electricity is therefore the principal abatement lever, complemented by efficiency, perfluorocarbon control and, over the longer term, inert-anode technologies. Recycling can also reduce demand for primary production.

Carbon-price incentives, investment costs and complementary policies

Deep industrial decarbonisation requires predictable carbon incentives and complementary finance. Free allocation does not eliminate the opportunity cost of using a tradable allowance, but allocation that increases with output or closely tracks verified emissions, together with deficit protections and limits on passing carbon costs through to electricity prices, can weaken the incentive to abate. [21]

"CBAM makes credible carbon accounting essential to the export competitiveness of Chinese producers in the EU market."

CCS can address residual emissions, including those arising from cement production processes, but its deployment depends on costs, transport and storage infrastructure, and finance. Long-term steel-sector modelling estimates average levelised CCS costs of CNY 187 to CNY 194 per tCO_2 under optimised deployment in scenarios extending to 2060. [20] The gap between carbon-price incentives and deep-abatement costs reinforces the need for complementary finance and industrial policy.

Sectoral policies also shape investment alongside the ETS. The aluminium industry's action plan covering the period from 2025 to 2027 targets a clean-energy share of at least 30 per cent in electrolytic aluminium production and recycled aluminium output of at least 15 million tonnes by 2027. It also provides that, in principle, no new captive coal-fired units should be added. [22] These measures can reinforce carbon-price incentives while addressing barriers that carbon pricing alone cannot resolve.

Electricity reform and coal-fleet adjustment

Carbon pricing can improve the relative competitiveness of low-carbon electricity when allowance costs influence dispatch, contracting and tariffs. The effects on storage, coal-to-gas switching and renewable hydrogen also depend on electricity and fuel prices, charging or production patterns, and market rules.

Coal investment complicates this adjustment. China commissioned 78 GW of coal capacity in 2025, with another 291 GW permitted or under construction at year-end. [23] However, these additions do not predetermine future emissions. These will depend on plant utilisation, renewable integration and retirement decisions.

As a result, coordination among electricity trading, carbon pricing and green electricity certificates is central to transmitting carbon-price incentives through the energy system. [24] A credible carbon-market trajectory must maintain electricity reliability while supporting changes in generation and investment, greater system flexibility and the retirement of inefficient capacity.

5. Regional cooperation, CBAM exposure and Article 6

CBAM exposure

The EU Carbon Border Adjustment Mechanism (CBAM) entered its definitive phase in January 2026. It covers specified goods in iron and steel, cement, aluminium, fertilisers, electricity and hydrogen. Certificate sales will begin in February 2027, with the first declaration and surrender obligations for 2026 imports due by 30 September 2027.

CBAM makes credible carbon accounting essential to the export competitiveness of Chinese producers in the EU market. EU importers bear the obligations, but Chinese suppliers face commercial pressure through purchasing decisions, contract negotiations and requests for emissions information. Producers need installation- and product-level emissions data consistent with CBAM requirements and reconciled with domestic ETS reporting. Also, where actual emissions are used, accredited verification is required. [25, 26] Reliable records for 2026 are therefore necessary despite the later payment timetable. [25]

Carbon prices paid in the country of origin may reduce CBAM liabilities, but only the price effectively paid on the goods' embedded emissions counts. Any free allocation, rebates or compensation must be deducted from that amount. [26] China's current industrial allocation limits net allowance-purchase requirements and may therefore limit deductible payments.

CBAM also strengthens the case for tighter ETS allocation and phased auctioning. Eligible domestic payments may reduce border liabilities, while auction revenue can support industrial transition. Reform should combine credible scarcity with assessments of sectoral trade exposure and adjustment needs to serve China's decarbonisation objectives.

Article 6 cooperation

Article 6 provides a framework for cooperation through internationally transferred mitigation outcomes (ITMOs). Participation requires national authorisation, tracking, reporting and corresponding adjustments to prevent double counting. [27] For China, cooperation could provide access to mitigation outcomes from partner-country projects. This would complement domestic emissions reductions. Japan's Joint Crediting Mechanism and Singapore's bilateral implementation agreements also offer transferable experience to China.

Climate Bridge's September 2026 analysis explores developing overseas projects under recognised CCER methodologies and bilateral arrangements to broaden China's access to mitigation opportunities. [28] However, China's use of these outcomes would require agreement on eligibility rules and consistent national accounting.

Article 6 cooperation does not require ETS linkage, but international acquisitions, domestic offset eligibility and ETS rules need coordinated design. Using ITMOs towards China's NDC requires authorisation by the host country and corresponding adjustments under Article 6. Clear rules connecting enterprise credit use with national accounting can prevent double counting and reduce inconsistent carbon-price signals.

Regional cooperation and implementation support

The CJK Tripartite Joint Action Plan on Environmental Cooperation 2026-2030 provides an institutional platform for exchange on climate policy and MRV. [29] China also co-chairs the Open Coalition on Compliance Carbon Markets with the European Commission, under the chairmanship of Brazil. This role offers a complementary cooperation platform. [30]

China's experience offers practical lessons for other countries, but, like any country's experience, it reflects its own institutions and requires careful assessment before application elsewhere. Cooperation should examine both implementation achievements and incentive limitations. Mutual learning should therefore focus on the reasoning, outcomes and trade-offs behind design choices. These must then be adapted to each country's institutions.

Revenue use is an area where China can learn from jurisdictions with established auctioning or carbon-tax experience, including Europe and North America. Exchanges can examine how revenues support industrial transition, vulnerable households and affected workers, and how transparent revenue use can strengthen public acceptance.

"Mutual learning should therefore focus on the reasoning, outcomes and trade-offs behind design choices."

6. Challenges and gaps

Energy-security and industrial adjustment complicate credible tightening

Output-linked power-sector allocation, emissions-based industrial allocation and deficit protections limit allowance scarcity and weaken incentives for emissions reductions and long-term investment. [21] The government's staged transition to absolute caps requires coordination with electricity supply reliability, industrial adjustment and regional economic interests. [10] Growing penetration of variable renewable energy increases balancing and system-stability needs. However, one challenge to tightening allocation is that China has continued to expand coal capacity, partly to provide backup and flexibility alongside wind and solar; nevertheless, future emissions will depend on plant utilisation and retirement timelines. [23] Uncertainty about cap trajectories, the treatment of surplus allowances and the duration of protections make future carbon costs difficult to assess and reduces confidence in low-carbon investment.

Electricity-market arrangements and enterprise incentives weaken carbon-cost transmission

Dispatch, contracting practices and regulated tariffs limit how far generators can pass carbon costs through to electricity prices, weakening the operating and investment signals they receive for decarbonisation. Limited enterprise carbon-management capacity, state-owned enterprises' performance criteria and internal trading restrictions can further discourage active allowance management. [21] When generators cannot pass through carbon costs, industrial electricity users also receive weak abatement signals. Effective reform requires carbon costs to inform production, procurement and investment decisions.

Uneven data quality and verification capacity constrain credible expansion

The ETS's expansion into industrial sectors increases accounting and verification demands, especially for clinker process emissions and aluminium perfluorocarbon emissions. Sector-specific expertise, measurement equipment, internal controls and traceable data are essential. [11] Uneven enterprise, verifier and provincial capacity can distort baselines and allocation. This may, in turn, constrain credible tightening and erode confidence that compliance obligations are comparable across firms and provinces.

7. Policy recommendations

Finalising and publishing sectoral cap and allocation pathways

The planned ETS transition will combine caps with free and paid allocation. [10] By mid-2027, sectoral pathways to 2030 should be published, along with an indicative direction beyond 2030 that is consistent with national climate targets. These should also establish tightening schedules and the conditions for ending transitional protections. Finally, they should clarify how new entrants and surplus allowances will be treated.

Strengthening data, verification and transparency

The planned improvements to verifier management are an important first step towards more reliable emissions data. [10] The next steps are to establish readiness checks before coverage expansion, strengthen sector-specific accounting and verifier oversight, and clarify national and provincial responsibilities. Timely disclosure of allocation, emissions and compliance data will improve transparency, but exporters will also need support to reconcile ETS data and product-level accounting that CBAM requires.

Introducing paid allocation and market-stability rules

The government has committed to an ETS that combines free and paid allocation by 2030, supported by market-stability arrangements [10]. Design work should be completed by the end of 2027 so that phased auctioning can begin before 2030. Transition arrangements should vary according to each sector's exposure to trade and carbon cost, without weakening the planned shift to absolute caps. Market oversight should be strengthened. Revenues should be used transparently to support industrial transition and help affected households and workers.

Connecting carbon pricing with electricity reform and finance for industrial decarbonisation

Electricity-market reform and enterprise incentives need to be coordinated so that carbon costs can inform production, procurement and investment. This may require phasing out protections that cap allowance shortfalls and reforming power pricing, while safeguarding supply reliability and vulnerable consumers. Public and private finance, including future auction revenues, should support industrial decarbonisation. The government could also assess the feasibility of sovereign transition bonds, building on the sovereign green bonds it has issued since 2025. [31] Japan's Climate Transition Bonds offer a model for linking such bonds to carbon pricing revenues [32].

Strengthening regional cooperation and Article 6 readiness

Country-led cooperation through CJK, ASEAN and the Open Coalition on Compliance Carbon Markets can prioritise compatible accounting, verifier training and mutual learning adapted to national institutions. At the domestic level, progress would be supported by Article 6 authorisation and accounting procedures, an assessment of CCER integrity against international principles, and a review of offset use to preserve domestic abatement incentives.

8. Outlook

The ASEAN Economic Community Strategic Plan 2026–2030 prioritises common recognition and interoperability among carbon markets in the region. [33] China's market scale, expansion into industrial sectors and emissions-data management offer a wealth of information for its Southeast Asian partners. By examining why China made its design choices, what it achieved and what trade-offs it accepted, these countries can judge how far its experience applies to their own circumstances.

A practical cooperation programme could begin with country-led assessments of legal mandates, institutions, emissions data, enterprise and verifier capacity, electricity-market arrangements and distributional impacts. Near-term work could advance compatible MRV, traceable records and safeguards against double counting, while a longer-term agenda could include credit recognition, Article 6 transfers and ETS linkage.

International technical platforms, including the International Society for Energy Transition Studies (ISETS), could convene regulators, operators, verifiers and enterprises across countries. Dialogues and jointly developed guidance resources could translate shared lessons into country-led work plans and provide continuous and mutual support. These steps would allow Southeast Asian member states to draw on China's lessons and experience rather than start from scratch, while their feedback would help China improve its own ETS.

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JAPAN

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1. Key messages

Japan launched its mandatory Green Transformation Emissions Trading System (GX-ETS) in 2026 following coordinated updates to its energy, industrial and climate policies. The system is expected to cover around 60 per cent of national greenhouse gas (GHG) emissions and build on existing monitoring, reporting and verification (MRV) system and carbon crediting mechanisms. The GX-ETS is designed to strengthen progressively through increasing fuel-neutral power-sector benchmarking from 2029 and allowance auctions from 2033.

Three implementation tests will determine whether this architecture delivers sustained investment and emissions reductions. Because aggregate allowance supply is determined bottom-up at the company level, rather than through an ex-ante absolute cap, whether total allowance supply aligns with the nationally determined contribution (NDC) remains an important implementation issue. Public-sector support needs to catalyse private investment and durable market demand as technologies mature, while carbon-cost signals need to influence real operating and investment decisions. Timely delivery of low-carbon power and supporting infrastructure is also essential for firms to implement their decarbonisation plans.

Policy choices also have regional implications. Through the Joint Crediting Mechanism (JCM), Article 6 cooperation and platforms such as Asia Zero Emission Community (AZEC), Japan connects its domestic transition framework with mitigation activity in partner countries. Its near-term regional contribution may therefore lie more in practical interoperability in MRV, credit authorisation, accounting and market infrastructure than in formal ETS linkage. This will, however, depend partly on clearer post-2030 credit rules and the continued operationalisation of Article 6 procedures across partner countries.

2. Context and baseline

Carbon emission profile

The total GHG emissions of Japan in 2024 were 1,046 million tonnes of carbon dioxide equivalent ($MtCO_2e$). Net emissions after removals were 994 $MtCO_2e$. [1] Before allocation of electricity and heat, industry and energy transformation emitted 237 $MtCO_2$ and 393 $MtCO_2$ respectively, while industrial processes and product use accounted for a further 37 $MtCO_2$. Together, these sources accounted for around 70 per cent of Japan's carbon dioxide (CO_2) emissions. On an end-use basis, iron and steel alone accounted for 126 $MtCO_2$, around 13 per cent of national CO_2 emissions. [1] Coal supplied 28.1 per cent of electricity, [2] but accounted for around 60 per cent of fossil-fuel power-generation CO_2 emissions. [3] This fact underscores the importance of low-carbon power supply for industrial transition.

National climate policy

In February 2025, the Cabinet updated Japan's policy architecture covering mitigation, industrial transition and energy planning. The Plan for Global Warming Countermeasures outlines the national mitigation pathway: on the pathway to carbon neutrality by 2050, GHG emissions are to fall 46 per cent below 2013 levels by 2030, 60 per cent by 2035 and 73 per cent by 2040. [4] The GX2040 Vision sets the direction for industrial transition. This includes using GX Economy Transition Bonds to bring forward funding for transition investment against future carbon-pricing revenues. [5] The Seventh Strategic Energy Plan sets the long-term direction for power-sector transition and energy-system development. [6]

Alongside these policy frameworks, the amended GX Promotion Act provides the legal framework for carbon pricing: the national GX-ETS becomes mandatory for large direct emitters from 2026, followed by a fossil-fuel levy from 2028 and power-sector allowance auctions from 2033. Revenues from the levy and auctions will be used to repay the GX bonds by 2050. [7]

"Public-sector support needs to catalyse private investment and durable market demand as technologies mature, while carbon-cost signals need to influence real operating and investment decisions."

3. State of the emissions trading system and the carbon market

The mandatory GX-ETS builds on existing carbon-market infrastructure. Introduced in 2006, the System for Calculation, Reporting and Public Disclosure of Greenhouse Gas Emissions (SHK) established an MRV foundation and built institutional capacity. In 2013, the J-Credit and JCM schemes added domestic and international crediting experience, and the voluntary GX League pilot from 2023 has built corporate target-setting, reporting and pilot-trading capacity while informing market-rule development. Mandatory participation for large direct emitters began in 2026, with J-Credits and JCM credits permitted for compliance within defined limits. [7]

Coverage and allowance supply

Entities are covered whose average annual direct CO_2 emissions over the preceding three fiscal years reach at least 100,000 tonnes. The system is expected to cover 300 to 400 companies, around 60 per cent of national GHG emissions. [7] Allowances are initially free of charge at the company level. Sectoral benchmarks are used where applicable. Otherwise, grandfathering is based on historical emissions, with adjustments made for material changes in activity. In the power sector, the system begins with fuel-specific benchmarks; the share of allocation based on a common fuel-neutral benchmark rises to 20 per cent in 2029 and 40 per cent in 2030, increasing the relative emissions-reduction pressure on coal-dependent generators. Auctioning in the power sector is scheduled to begin in 2033. Because aggregate supply is the sum of company-level allocations, there is no ex-ante absolute cap. Aggregate allocation is not directly tied to the NDC, but the government has committed to ongoing review to reach its NDC obligations. [7]

MRV and compliance

For each compliance year, covered entities submit third party-verified target emissions, after which the authority allocates allowances. Actual emissions are then verified and reported after the end of the year; once the authority confirms the surrender obligation, the required allowances must be surrendered within about two months. Emissions reporting and allowance-account management are handled through the digital Emissions Trading Management System (ERMS). [7]

"The system is expected to cover 300 to 400 companies, around 60 per cent of national GHG emissions."

Price signal

The designated allowance market will be operated by the GX Acceleration Agency and is scheduled to open in autumn 2027. [7] There is therefore no mandatory-market price or liquidity record yet, because participation, fair trading and liquidity rules are still being developed. Different price-stabilisation mechanisms apply at the upper and lower ends of the market. If prices rise sharply, a company may settle its shortfall by paying a charge based on the reference upper trading price. If the market price remains below the adjustment reference trading price for a defined period, the GX Acceleration Agency may purchase allowances through a reverse auction. The upper mechanism places a more direct limit on shortfall costs, while the lower operates through reverse-auction intervention rather than a standing fixed-price floor. For 2026, the reference upper trading price is JPY 4,300 per tCO_2 and the adjustment reference trading price is JPY 1,700 per tCO_2. [8] From 2027 to 2030, both are increased annually from the previous year's level by 3 per cent plus expected inflation for the relevant year. [8]

Offset and credit interface

The J-Credit and JCM are administered separately from the allowance market. For the period from 2026 to 2030, J-Credits and JCM credits combined may be used for compliance up to 10 per cent of a company's actual annual emissions. After 2030, credit eligibility, usage limits and treatment of pre-2030 mitigation outcomes remain undecided. [7]

4. Industrial decarbonisation and energy transition linkages

Japan combines the GX-ETS with large-scale fiscal and financial support for industrial transition. The government plans to issue approximately JPY 20 trillion in GX Economy Transition Bonds over ten years, securing funding in advance and aiming to catalyse more than JPY 150 trillion in public and private investment. [5]

Long-term investment strategies cover 16 priority fields, including hard-to-abate sectors such as steel, chemicals, cement and hydrogen. Projects will be funded through annual budgets and competitive calls. [5] The GX Acceleration Agency supports implementation by using debt guarantees and equity investment to absorb technology, construction and commercialisation risks that private financiers may be unwilling to bear. [9]

A representative case is Japanese steelmaker JFE Steel's JPY 329.4 billion electric arc furnace project at Kurashiki. It is supported by up to JPY 104.5 billion in GX Bond-funded subsidies [10] and approximately JPY 8 billion in GX Acceleration Agency guarantees for commercial lending. [9] The project illustrates how subsidies and guarantees are combined to de-risk large industrial transition investments.

Introduced in 2025, the GX Strategic Areas initiative extends support to place-based delivery, combining industrial clustering with decarbonised power, shared infrastructure and regulatory reform. Its selection framework also considers project feasibility, private finance, prospective off takers and local-government commitment. [11]

Demand-side support is also emerging through public procurement and downstream consumer incentives. In 2025, the Green Purchasing Act began prioritising steel with verified emissions-reduction performance and product carbon-footprint information in government procurement. The Act does not, however, guarantee purchase volumes or price premiums. Separately, green steel is also being piloted in government-commissioned civil works. Also, the Clean Energy Vehicle scheme increases consumer subsidies for vehicles whose manufacturers use qualifying lower-impact steel, indirectly encouraging automakers' green-steel procurement. [12]

In the power sector, the early transition is driven primarily by energy policy, with the GX-ETS carbon-cost signal strengthening progressively over time. The Seventh Strategic Energy Plan was adopted in 2025 and sets a 2040 power mix of renewables at between 40 to 50 per cent, nuclear at around 20 per cent and thermal generation at between 30 to 40 per cent. [6] The Seventh Plan positions renewables as Japan's largest source of electricity by 2040, demonstrating a strong commitment to expanding renewables. The nuclear share remains broadly similar. However, the previous commitment to reduce dependence on nuclear power as much as possible has now shifted towards maximising its use alongside renewable energy.

These targets are transmitted through non-fossil procurement obligations for electricity retailers that purchase power from generators or wholesale markets and that supply at least 500 million kilowatt-hours (kWh) annually. These obligated retailers account for around 97 per cent of retail electricity sales, [13] giving the mechanism broad market reach. The national non-fossil procurement target is 44 per cent by 2030, and a target of at least 60 per cent by 2040 was proposed in line with the Seventh Strategic Energy Plan. [14]

On the supply side, the Feed-in Tariff provides long-term fixed-price purchases of renewable electricity, while the Feed-in Premium adds a variable premium linked to market prices. This encourages generators to respond to market demand. [6]

Rules that reduce thermal output and raise its carbon costs operate in parallel. During periods of electricity oversupply, thermal generation must be reduced before renewable output is curtailed; [6] if renewable supply expands sufficiently, this reduces thermal utilisation and market revenues. From 2025, coal-fired plants that cannot demonstrate a design efficiency of at least 42 per cent face a 20 per cent reduction in capacity-market revenues if annual utilisation exceeds 50 per cent. [15] However, the measure is suspended from April 2026 to March 2027 to safeguard security of supply. [16]

In addition to these energy-policy measures, the GX-ETS progressively strengthens the carbon-cost signal. In 2029, power sector allocation will shift from fuel-specific towards fuel-neutral benchmarking and in 2033, auctioning will begin. [7] These changes should strengthen incentives for fuel switching. [6] The pace of change in the power mix will therefore depend not only on renewable supply expansion and tighter treatment of thermal generation, but also on how GX-ETS carbon costs affect generator operating decisions and how they are transmitted through wholesale and retail electricity prices.

5. Regional cooperation, CBAM exposure and Article 6

CBAM exposure and response

The Research Institute of Economy, Trade and Industry estimates carbon border adjustment mechanism's (CBAM) economy-wide impact to be relatively small for Japan, but notes that it could become more significant as emission regulations tighten over time. [17] Direct exposure is concentrated in steel: steel exports to the European Union (EU) amount to approximately 1.5 per cent of domestic crude-steel production and around 3 per cent of Japanese total exports to the EU. [18] The Ministry of Economy, Trade and Industry (METI) identifies the core CBAM implementation issues as product-level embedded-emissions accounting, recognition of carbon costs borne in Japan and third-party verification. [19] The immediate focus is therefore less on cushioning a macroeconomic shock than on securing reliable emissions information and compatibility between the relevant systems.

The shift from facility-level reporting to product-level embedded-emissions accounting creates new practical burdens for firms; for complex goods, this can also require supplier data on relevant precursor materials. The government has sought to ease implementation through product-specific calculation guidance and practical emissions-accounting manuals. [19] With the EU now advancing a proposed extension of CBAM to selected steel- and aluminium-intensive downstream products from 2028, [20] these accounting requirements and associated competitiveness concerns could extend further across Japan's manufacturing supply chains. Japan has engaged with the EU to recognise domestic carbon costs under CBAM. Relevant measures include existing energy taxes and regional ETSs, as well as the GX-ETS and the fossil-fuel levy scheduled to begin in 2028. [21]

Article 6 and crediting readiness

Building on the JCM, Japan has entered the early operational phase of Article 6. Although Internationally Transferred Mitigation Outcomes (ITMOs) are not limited to the JCM, the JCM's existing project portfolio provides a substantial pipeline of mitigation activities whose outcomes could be authorised for international transfer under Article 6. By mid-2026, the JCM covered 300 projects across 32 partner countries, [22] with 194 in Indonesia, Thailand, Viet Nam and the Philippines. [23]

Mitigation outcomes from existing JCM projects are not automatically transferable as ITMOs because partner-country authorisation and corresponding adjustments are required; delays in completing these steps are a bottleneck. By June 2026, JCM credits from four partner countries had been issued as ITMOs into Japan's JCM registry. [24] Given that projects can take several years from identification to issuance and transfer, unresolved post-2030 credit eligibility and usage rules weaken demand visibility and investment predictability for long-lived JCM projects, underscoring the need for clearer long-term rules.

Regional cooperation

Japan already has well-established channels for transition cooperation with Southeast Asia. The JCM, now moving into Article 6 implementation, has built a large project pipeline concentrated in the region. In parallel, the Japan-proposed Asia Zero Emission Community (AZEC) combines policy coordination, public finance and private-sector participation to develop and finance decarbonisation projects and address implementation bottlenecks. Some of these efforts are also linked to bilateral crediting and Article 6 implementation through the JCM. [25]

Japan also has an established carbon-market cooperation channel with China and the Republic of Korea through the Tripartite Environment Ministers Meeting (TEMM). The joint action plan for 2026–2030 provides for cooperation on MRV, national carbon-pricing systems and international carbon markets. [26] However, the extent to which this translates into operational cooperation will depend on implementation, particularly in light of the evolving China–Japan relationship since late 2025.

Taken together, Japan's regional channels already span policy dialogue, project development and finance, and carbon-credit implementation. There is an opportunity to connect these functions more coherently by linking China-Japan-Republic of Korea (CJK) policy and market cooperation with Southeast Asian project delivery and Article 6 implementation.

6. Challenges and gaps

Japan already has the principal instruments for carbon pricing, industrial support and energy policy in place. The remaining challenge is whether the design and interaction of these instruments can generate effective incentives, sustain investment and reduce emissions in practice.

The carbon-cost signal generated by the GX-ETS may be constrained by its allocation structure and upper-price mechanism, while the mitigation contribution expected from the system within the national mitigation pathway also remains insufficiently clear.

The GX-ETS provides incentives to improve emissions intensity through progressively tighter benchmarks. However, sustained increases in activity above specified thresholds lead to additional free allocation, which can partially offset the carbon-cost signal. [7] Economic studies of activity-linked updating show that such allocation can operate as an implicit output subsidy relative to fixed allocation. [27] Modelling studies also indicate that achieving the same absolute emissions reduction may require a higher carbon price under output- or intensity-based systems than under mass-based cap-and-trade. [27]

Nevertheless, Japan's GX-ETS includes an upper-price mechanism to provide cost stability. This limits the extent to which a stronger price signal can compensate for the carbon-cost signal weakened by the allocation structure. Japanese analysis has noted that the 2026 upper reference price of JPY 4,300 per tCO_2 [8] may be insufficient relative to the costs of some high-cost transition technologies, including hydrogen, ammonia and **carbon capture, utilisation, and storage** (CCUS). [28]

A further challenge is assessing whether aggregate allowance allocation under the GX-ETS is aligned with Japanese national mitigation targets. The GX-ETS has no predetermined absolute aggregate cap, and its expected contribution to meeting the NDC has not been separately quantified. The Diet has called for verification and disclosure of whether aggregate allocation contributes to the NDC and the 1.5 °C goal, and for corrective measures if necessary [29] but specific triggers and adjustment mechanisms remain unspecified.

It remains uncertain whether an industrial transition brought forward through public finance can remain sustainable as public support recedes.

Japan is using both public finance and financial instruments to reduce upfront technology costs and investment risks. Prolonged reliance on such support, however, may create fiscal constraints. GX Economy Transition Bonds are to be repaid from future carbon-pricing revenues, [5] but recent modelling suggests that this revenue base could weaken as decarbonisation reduces taxable emissions. [30] Long-term sustainability therefore depends on targeting public capital where it is most needed, while also encouraging investment momentum to progressively shift to private demand and capital.

Both conditions remain challenging. First, the government plays a substantial role in selecting supported technologies and projects despite uncertainty over future technology costs and market conditions. Concentrating support in particular technologies over long periods could make it harder to reallocate capital when more cost-effective alternatives emerge. This would prolong dependence on public support.

Second, market demand capable of sustaining private investment remains underdeveloped. METI has identified several challenges in building self-sustaining markets for GX products. For example, it has proven difficult to generate sufficient demand for products such as green steel at prices that reflect their environmental value. [12] Several key post-2030 carbon-market parameters also remain insufficiently specified for long-lived investments. This limits firms' and investors' ability to assess future carbon costs and market returns.

Effective transmission of carbon costs and timely delivery of infrastructure to support the low-carbon transition remain challenging.

For the GX-ETS to drive power-sector transition, carbon costs must influence operating and investment decisions. Moreover, the required low-carbon generation and grid infrastructure must be delivered on time. The 2025 withdrawal of three offshore-wind projects by the Mitsubishi-led consortium showed that even awarded projects can be discontinued as costs, supply-chain conditions and revenue prospects change. [31] Delays to the Sakuma East Trunk Line similarly illustrate how large-scale grid projects can be held back by non-financial factors such as land acquisition, permitting and unexpected site conditions. [32] In response, Japan has reformed its offshore-wind auction framework and expanded the public-financing role of the Organization for Cross-regional Coordination of Transmission Operators (OCCTO). Nevertheless, these execution risks remain. [33] [34]

GX Strategic Areas seek to alleviate some of these bottlenecks by coordinating the location of industrial demand, decarbonised power and infrastructure. However, alongside models that align new demand with low-carbon power, the initiative also includes the regeneration of existing industrial clusters. In such cases, demand is less mobile, and additional costs and delay risks may still arise in connecting the required energy and infrastructure to

existing sites. [11] If this infrastructure is not delivered on time, firms may face constraints in accessing practical low-carbon transition pathways in response to carbon costs.

7. Policy recommendations

These proposals build on announced reforms and identify additional measures to strengthen implementation and effectiveness.

Clarification of the GX-ETS contribution to the NDC and strengthening long-term market rules.

The expected NDC contribution of GX-ETS-covered sectors need to be clarified, and the aggregate allocation regularly assessed in relation to that contribution. Where a material divergence emerges, criteria and triggers could inform how this will impact subsequent benchmarks and adjustment factors. For key rules shaping long-term carbon-cost exposure, decision principles and review timetables should be communicated early, particularly where post-2030 parameters remain subject to future review.

Over the medium to long term, implementation evidence should be used to assess progressively stronger aggregate-scarcity mechanisms, including a multi-year emissions budget or a more explicit aggregate constraint.

Adjusting GX industrial support based on performance and strengthening visibility of market demand

Major GX-supported projects need clear evaluation criteria and review points that are established in advance. Reviews should assess whether public support has catalysed transition investment and, once projects are operational, whether it has delivered realised emissions reductions. The results would directly inform subsequent support levels, technology eligibility and resource allocation. Where performance falls short, remedial actions and reassessment points can be set; if technology costs, market conditions or the competitiveness of alternatives change materially, support can be reduced or reallocated.

To strengthen demand visibility, public procurement could move beyond preferential purchasing by signalling procurement volumes or shares over a defined future period. If private demand is fragmented across multiple buyers, demand aggregation could consolidate purchase commitments into longer-term supply contracts, potentially coordinated by a public intermediary.

A more ambitious option would be to link selected GX support to securing long-term purchase commitments of defined duration and volume. This would help ensure that production support is matched by more credible market demand.

Strengthening transition-infrastructure delivery and power-sector carbon-cost transmission.

To turn GX-ETS signals into real-world transition, Japan could expand more centralised coordination and joint infrastructure-development approaches where fragmented permitting or shared infrastructure repeatedly constrain project delivery. In the power sector, the government should continue to assess whether GX-ETS carbon costs are materially influencing operating and investment decisions.

If the observed effects remain limited, broader public discussion should consider the trade-off between near-term transition costs and the potentially higher long-term costs of delayed decarbonisation. If the assessment finds that carbon-cost signals remain weak, Japan could consider options to strengthen them, including adjustments to the share or phase-in speed of the fuel-neutral benchmark and, if necessary, reconsider the timing or share of power-sector auctioning.

8. Outlook

The Japanese GX framework offers a distinctive example of an integrated transition architecture. It builds on established corporate emissions MRV and prior carbon-crediting and pilot-trading experience, while connecting carbon pricing, industrial policy, public finance and energy transition. As the GX-ETS becomes operational and progressively tightens, the key test will be whether this integrated approach can translate into sustained private investment and realised emissions reductions.

Japan also has a relatively developed regional interface through the JCM, Article 6 cooperation and platforms such as AZEC, providing an opportunity to advance practical interoperability across Asian carbon markets. This could include shared approaches to MRV, credit authorisation, accounting and market infrastructure rather than immediate formal ETS linkage. Realising this opportunity, however, will depend on greater clarity over post-2030 domestic credit rules and continued operationalisation of Article 6 procedures across partner countries.

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REPUBLIC OF KOREA

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1. Key messages

Republic of Korea's challenge has shifted from building a carbon market to strengthening one that is already established. Phase 4 operates from 2026 to 2030. It lowers the cap by 16.8 per cent relative to Phase 3 and strengthens both power-sector auctioning and market-stability mechanisms. The key test is whether these reforms can generate sustained scarcity despite accumulated surplus. Over the longer term, the challenge is to provide a credible carbon-cost signal that firms can incorporate into long-lived investment decisions.

The binding constraints on deep decarbonisation differ across industries and cannot be reduced to the carbon price alone. Steel faces commercial-scale deployment and low-carbon energy constraints; petrochemicals face weakened investment capacity; and cement faces technology, standards and demand constraints. Capital support and transition finance have been introduced, but the arrangements needed to combine instruments to address project-specific bottlenecks and to carry initial commercial-scale deployments through final investment decision (FID) and into commercial operation remain insufficiently developed.

The power system is a critical gateway in two respects: transmitting carbon costs and delivering low-carbon electricity. Phase 4 concentrates expanded auctioning in the power sector, yet generation costs do not pass through to retail tariffs at the same time or to the same extent. Grid connection constraints and insufficient flexibility may also prevent additional low-carbon generation from meeting new industrial demand.

The Republic of Korea's experience is more valuable as accumulated implementation evidence than as a policy model to replicate. Monitoring, reporting and verification (MRV) and compliance capacity were built before market launch, while early design choices have required adjustment as the system has matured. With international mitigation accounting for 12.8 per cent of the country's 2030 mitigation pathway, credit integrity and the timely authorisation, issuance and transfer of mitigation outcomes under Article 6 are increasingly important.

"…the challenge is to provide a credible carbon-cost signal that firms can incorporate into long-lived investment decisions."

2. Context and baseline

Carbon emission profile

Republic of Korea's preliminary greenhouse gas (GHG) emissions were 691.58 million metric tonnes of carbon dioxide equivalent ($MtCO_2e$) in 2024, accounting for around 1.3 per cent of global GHG emissions. Industry—including fuel combustion and process emissions from manufacturing—accounted for 41.3 per cent, while the energy transformation sector, primarily power generation, accounted for 31.6 per cent. [1, 2] Together, the industry and energy transformation sectors represented around three quarters of national emissions, making their transition central to Republic of Korea's mitigation pathway.

The economic structure of Republic of Korea is heavy-industry intensive, so it is unsurprising that the industrial sector is a significant contributor to national emissions. Within industry, steel, petrochemicals, cement and refining together accounted for approximately 80 per cent of industrial emissions in 2022, with steel alone accounting for 38 per cent. [3] With major industries already operating at relatively high levels of energy efficiency, further reductions increasingly require process transformation and large-scale investment.

In the power sector, nuclear and new and renewable energy supplied around 42 per cent of generation in 2024, while gas and coal supplied 28.1 per cent each. [4] Renewable expansion is diversifying a generation system historically dominated by large, centralised generators. Nevertheless, transmission and distribution remain concentrated under the Republic of Korea Electric Power Corporation (KEPCO).

National climate policy

The Republic of Korea's climate framework combines a 2050 carbon-neutrality goal with nationally determined contribution (NDC) targets. Republic of Korea aims to reduce GHG emissions by 40 per cent by 2030 relative to 2018 gross emissions, and by 53 to 61 per cent by 2035 relative to 2018 net emissions. [5]

Carbon pricing is anchored in the Republic of Korea Emissions Trading System (K-ETS). It was launched in 2015 as East Asia's first nationwide mandatory emissions trading system with an absolute emissions cap. [6] Following three successive phases—Phase 1 (from 2015 to 2017), Phase 2 (from 2018 to 2020) and Phase 3 (from 2021 to 2025)—the K-ETS entered Phase 4 (from 2026 to 2030). In Phase 4, the new cap is 16.8 per cent lower than in Phase 3 and is aligned with the 2030 NDC pathway. [7]

3. State of the emissions trading system and the carbon market

The K-ETS was built on an existing GHG management architecture. In 2002, Republic of Korea began participating in the Kyoto Protocol's Clean Development Mechanism (CDM), and in 2005, the Republic of Korea Voluntary Emission Reduction programme (KVER) was launched. These helped develop early experience in quantifying and verifying project-level reductions. The Target Management System (TMS), fully implemented in 2012, extended mandatory MRV and reduction targets to large emitters above defined thresholds. This helped build the emissions-accounting and compliance capacity later used under the 2015 K-ETS. [6] The K-ETS brought the largest emitters into a cap-and-trade system, while smaller emitters above the TMS thresholds remained under target-based management. In its first year, the K-ETS covered 525 entities and roughly 70 per cent of national GHG emissions. [8, 9] Across the first three phases and into Phase 4, the K-ETS has progressively expanded auctioning, benchmarking and market participation, while adjusting banking rules and strengthening market stability mechanisms in response to evolving market conditions and participant behaviour.

Coverage and cap

The K-ETS covers direct and indirect emissions from entities across sectors—including industry, power, buildings and transport—with average annual emissions of at least 125,000 metric tonnes of carbon dioxide equivalent (tCO_2e), or individual installations with at least 25,000 tCO_2e, based on a preceding three-year average. [6] Phase 4 covers 772 entities, with a cap of approximately 2,537.3 $MtCO_2e$. Around 85.3 $MtCO_2e$ is set aside as a market-stabilisation reserve inside the cap. [7]

Allocation

Republic of Korea has progressively increased auctioning across the four K-ETS phases: from 0 per cent in Phase 1 to 3 per cent in Phase 2, 10 per cent in Phase 3, and finally 15 per cent in Phase 4. [6] The power sector increases auctioning more during Phase 4 than other sectors: from 15 per cent in 2026 to 50 per cent in 2030. Meanwhile, sectors at risk of carbon leakage have retained 100 per cent free allocation across phases. As a result, the effective auctioning rate was around 4 per cent in Phase 3 and is expected to reach 11 per cent in Phase 4. [7] Regarding free allocation, the share of K-ETS emissions covered by benchmarking (BM) has expanded as more emissions and activity data have become available: 6 per cent in Phase 1; around 50 per cent in Phase 2; 62 per cent in Phase 3; and 77 per cent in Phase 4. BM was generally based on average emissions efficiency through Phase 3. By the end of Phase 3, this average was estimated at roughly the top 37 per cent on a weighted-average basis; during Phase 4, this benchmark will progressively tighten to the top 20 per cent on the same weighted-average basis by 2030. [7]

MRV and compliance

Following each calendar-year compliance period, covered entities submit emissions reports verified by government-designated third-party verification bodies by the end of March. The reports then undergo conformity assessment, with emissions certified by the competent authority by the end of May. Entities have until the end of August to surrender allowances or recognised units matching their certified emissions. [6] During Phase 3, this post-certification compliance window was extended from one to three months to reduce trading concentration around the surrender deadline and support market liquidity. This compliance cycle builds on emissions accounting, third-party verification and administrative capacity developed under the TMS before the K-ETS was launched.

Market participation

Phase 1 deliberately limited participation to covered entities, reflecting industry concerns that financial participation could increase price volatility. However, as the market proved too thin, Phase 2 introduced two public policy banks as market makers to provide continuous buy and sell quotes. Phase 3 progressively widened participation beyond compliance entities to improve market liquidity and price discovery: securities companies were allowed to trade on their own accounts, followed by banks, insurers, fund managers and other institutional investors. Brokered trading through securities firms was also introduced to facilitate market access. [6] In Phase 4, the government is working with the Republic of Korea Exchange and specialised institutions to develop the trading infrastructure for an allowance futures market. [10]

Banking and market stabilisation

Phase 1 initially allowed unlimited banking, but surplus holders tended to bank rather than sell, contributing to thin liquidity. Banking restrictions were introduced toward the end of Phase 1 and linked to net sales during Phase 2 to encourage surplus allowances into the market. During Phase 3, accumulated surplus and weaker demand following COVID-19 contributed to persistent oversupply and falling allowance prices, highlighting the limitations of case-specific market-stability interventions. Therefore, Phase 4 introduces rule-based market-stability management through the Republic of Korea's Market Stability Reserve (K-MSR), although its detailed operating parameters are still being developed. Amid criticism that sales-linked banking restrictions could weaken longer-term price discovery, banking limits have also been eased. [7]

Price signal

From 2015 to 2020, allowance prices rose progressively until falling dramatically once the full impact of COVID-19 was reflected in the market. In 2015, the average price was KRW 11,007 per tCO_2e (approximately $10). [11] By April 2020, they had risen to KRW 42,500 (approximately $36). [12] Prices then fell sharply and remained weak through Phase 3, averaging KRW 9,393 per tCO_2e (approximately $7) in 2025. [6] Prices rebounded sharply as Phase 4 began, reaching KRW 29,600 per tCO_2e (approximately $22) on 1 October 2026, [13] suggesting expectations of tighter supply despite banked surpluses carried into the phase.

Offsets

Offsets serve as a limited compliance-flexibility mechanism in the K-ETS. Covered entities may use them for up to 5 per cent of their compliance obligations. [6] In 2023, amid relatively sufficient allowance supply, they accounted for around 0.2 per cent of total units surrendered. [14] Alongside limited allowance scarcity, growing scrutiny over credit integrity and associated reputational risks have weakened corporate incentives to develop offset projects, particularly overseas. While the first three Phases were largely CDM-based, Phase 4 is shifting the framework toward Article 6-based crediting and newer integrity standards, requiring operational adjustment but also creating an opportunity to strengthen credit quality. Meanwhile, recent reforms have focused mainly on easing practical constraints within offsets' limited compliance role, including removal of the separate limit on overseas offsets in 2021 and extension of the credit-conversion period from three to five years in 2023. [6]

4. Industrial decarbonisation and energy transition linkages

Republic of Korea is shifting from supporting the development and demonstration of decarbonisation technologies to supporting commercial-scale transition investment, including low-interest transition loans and competitive bidding for facility investment support. [15, 16] The next challenge is to combine these instruments around sector-specific investment bottlenecks.

In steel, Pohang Iron and Steel Company (POSCO) and Hyundai Steel together account for around 84 per cent of Republic of Korea's crude steel output, making their transition central to sector-wide decarbonisation. [17, 18] As major emitters and export-oriented producers facing domestic and external decarbonisation pressures, both have established pathways towards carbon neutrality by 2050. POSCO completed a 2.5 million tonne (Mt) per year electric arc furnace (EAF) in 2026 and is developing HyREX hydrogen-reduction technology. [19] Hyundai Steel, meanwhile, is moving from an EAF–blast-furnace hybrid process towards Hy-Arc and, ultimately, hydrogen-based steelmaking. [20] However, moving these pathways to commercial scale will require successful technology scale-up and substantial transition investment, alongside sufficient low-cost clean hydrogen and electricity, and buyers willing to pay a premium for low-carbon steel.

In petrochemicals, weakened corporate investment capacity may be a more immediate constraint. Rising self-sufficiency and overcapacity in China have reduced profitability and firms' internal capacity to invest. Since 2025, restructuring efforts have included plans to reduce domestic naphtha-cracking capacity by 18 to 25 per cent. [21] Some transition investments have also been delayed or withdrawn amid weak market conditions and investment-cost pressures. Where firms need to prioritise capital for stabilising existing operations, improved access to transition finance may not be sufficient to unlock new decarbonisation investment.

In cement, product standards can constrain the deployment of low-carbon technologies. Even where procurement rules favour low-carbon products, the Republic of Korea's current Industrial Standards (KS) may restrict the adoption of some new low-carbon cement formulations, limiting their wider market uptake. Republic of Korea has set ambitious targets for renewable expansion, including 100 GW of renewable capacity by 2030. [22] The current long-term electricity plan envisages carbon-free sources supplying 70.7 per cent of generation by 2038, [23] and by 2040, to have phased out coal power entirely. [5]

On the supply side, meeting these targets requires translating planned capacity into investable projects and delivering the resulting electricity to the grid. The government is shifting from certificate-based obligations towards competitive procurement and long-term fixed-price power purchase agreements to provide greater revenue certainty for new renewable projects. For offshore wind in particular, recent reforms also seek to reduce early-stage development risks through greater government involvement in site planning and integrated permitting. [22] Grid connection, transmission capacity and system flexibility will ultimately determine how much additional low-carbon electricity can be delivered.

"Where firms need to prioritise capital for stabilising existing operations, improved access to transition finance may not be sufficient to unlock new decarbonisation investment."

Different incentives support this transition across electricity-market participants. Higher power-sector auctioning under the K-ETS increases the relative cost of carbon-intensive generation and influences generation and investment decisions. In addition, corporate RE100 (an initiative for 100 per cent renewable electricity) and net-zero commitments create direct demand for renewable electricity. The K-ETS has more limited influence on broader consumer decisions: regulated retail tariffs limit carbon-cost pass-through, and most consumers have limited ability to reduce consumption or switch towards lower-carbon electricity in response. This weakens an additional channel for carbon pricing to stimulate low-carbon generation. At the same time, electricity prices below underlying costs have contributed to KEPCO's accumulated losses, which the Organisation for Economic Co-operation and Development (OECD) notes may delay necessary grid investment. [24]

5. Regional cooperation, CBAM exposure and Article 6

This section examines the external dimensions of power and industrial transition in Republic of Korea and complements the domestic policy design discussed in Sections 2 and 3.

CBAM exposure and response

The EU Carbon Border Adjustment Mechanism (CBAM) entered its definitive period in 2026. [25] Republic of Korea's exposure is concentrated overwhelmingly in steel, which accounted for $4.21 billion, or 91 per cent, of $4.62 billion in CBAM-covered exports to the EU in 2023. [26] While steel continues to receive free allocation under the K-ETS, the Republic of Korea's response to CBAM has focused on lowering product carbon intensity directly. The emerging challenge is how these reductions are measured and attributed under CBAM. Republic of Korea integrated steelmakers have long invested in site-wide efficiency, including extensive recovery and reuse of by-product gases across production processes and captive power generation. CBAM re-attributes these emissions and energy flows to individual products under EU-defined system boundaries and accounting rules. This can affect how domestic abatement measures appear in the embedded emissions of exported products. As a result, Republic of Korean authorities and steelmakers are pursuing technical dialogue with the EU while strengthening product-level emissions calculation and verification capacity.

Article 6 and crediting readiness

The 2030 Republic of Korean NDC pathway targets 37.5 million tCO_2e, or 12.8 per cent of planned reductions, to international mitigation. [27] Timely delivery is therefore critical, as mitigation outcomes used toward an NDC must fall within the same implementation period in which they occur. Under Article 6.2, Republic of Korea identified 18 priority partner countries, with 14 bilateral agreements concluded by September 2026. [28, 29] Eight activities had been recorded, but no internationally transferred mitigation outcomes (ITMO) had yet been transferred or received. [29] Consequently, making actual issuance and transfer is the immediate priority before delays erode their value for the 2030 target. Republic of Korea is also preparing Article 6.4 as an additional route for securing mitigation outcomes, although the mechanism remains at an early operational stage and faces the same timing pressure.

Regional cooperation

Republic of Korea has established cooperation channels with China and Japan through the Tripartite Environment Ministers Meeting (TEMM) [30] and with Southeast Asia through climate dialogues. [31] With the Association of Southeast Asian Nations (ASEAN), cooperation spans policy exchange, mitigation-project support and bilateral Article 6.2 arrangements. Along with better coordination across these efforts, the next step could be to translate country-level experience into shared regional tools and practices. Republic of Korea's manufacturing and carbon-accounting experience could make sector- and product-level MRV a practical starting point.

6. Challenges and gaps

While the Phase 4 cap is aligned with the 2030 NDC, firms need a credible medium- to long-term signal that carbon constraints will continue to tighten through 2035 and beyond.

If policy stringency is expected to weaken as political or institutional conditions change, firms have greater incentive to delay large transition investments and rely on shorter-term compliance measures. Republic of Korea's mitigation pathway makes this particularly important. Although gross emissions fell by around 2.0 per cent in 2024, [1] meeting the 2030 NDC will require reductions of more than 3.6 per cent per year going forward. [1] The 2035 NDC creates an even steeper pathway ahead, requiring average annual gross-emission reductions of over 4 per cent through

"Grid connection, transmission capacity and system flexibility will ultimately determine how much additional low-carbon electricity can be delivered."

2035. This increases the need to move beyond short-term compliance and bring forward structural transition involving long-lived investment in industrial plants and processes. A similar delivery gap exists in international mitigation, which forms part of the country's NDC pathway. Bilateral cooperation frameworks have expanded, but the time available to complete approval, issuance and transfer of mitigation outcomes and count them towards the 2030 NDC is narrowing.

Stronger carbon-price signals and expanding public support still need to translate into large-scale industrial transition investment.

As discussed above, the main constraints differ for the steel, petrochemicals and cement sectors. As a result, these cannot be addressed through a common carbon price or general capital support alone. Republic of Korea has introduced facility-investment support, transition finance and other instruments, but the arrangements for combining them around project-specific risks and carrying projects through FID to commercial operation remain insufficiently developed.

Regulated electricity tariffs weaken carbon-cost transmission, while grid constraints and potential misalignment between industrial investment plans and low-carbon power delivery pose further transition risks.

Higher auctioning in Phase 4 raises the direct carbon cost faced by power generators, but regulated retail tariffs limit how fully this signal reaches final consumers and influences demand and investment decisions. At the same time, grid and flexibility constraints can prevent additional low-carbon generation from reaching new industrial demand, making electricity supply itself a key bottleneck for industrial decarbonisation.

7. Policy recommendations

Transforming the direction of K-ETS tightening into a credible signal for long-term investment.

The announced direction of K-ETS reform should be translated into a clearer and more credible medium- to long-term signal that firms can incorporate into investment planning. Benchmarks should tighten over time, and changes follow pre-defined review criteria and adjustment rules, allowing the pace of tightening to adjust to economic and technological conditions while preserving the credibility of the longer-term direction across political and institutional changes.

A bold step would be to expand auctioning beyond the power sector, with a differentiated phase-down of free allocation for carbon-leakage sectors based on competitiveness, leakage risks and the commercial readiness of low-carbon technologies. While free allocation retains the opportunity cost of allowances, broader auctioning would increase direct carbon-cost exposure and generate additional revenue for transition support.

For international mitigation, the priority should shift from expanding bilateral cooperation frameworks to securing the actual authorisation, issuance and transfer of mitigation outcomes. Greater use of common technical foundations—including methodologies, MRV, data formats and registries—could reduce administrative burdens while maintaining environmental integrity. Digital MRV and tracking systems should be strengthened first, while technologies such as distributed ledgers can be tested if they demonstrably improve traceability or processing times. Against these challenges, policy should focus on improving the predictability and delivery capacity of existing institutions so that planned transition translates into actual investment and emissions reductions.

Combining industrial support with project-specific transition investment packages.

Carbon revenues and industrial support can help bring forward FID if combined around project-specific investment constraints. Tailored packages of support combining capital provisions, transition finance and risk-sharing instruments, such as Carbon Contracts for Difference (CCfDs), can be developed and deployed to enable infrastructure and demand-side measures. Support should be reviewed periodically to determine if it mobilises additional private investment, drives technological progress, carries projects through FID and commercial operation, and ultimately delivers verified emissions reductions. The findings can then inform subsequent support levels and eligibility.

Over the medium to long term, greater predictability of future carbon revenues could also allow the government to explore revenue-linked financing that brings transition investment forward. In sectors undergoing restructuring, such as petrochemicals, government financial support could be made conditional on credible low-carbon transition plans and follow-on investment. This would help ensure that restructuring contributes to longer-term industrial decarbonisation rather than stopping at short-term financial stabilisation.

Strengthening carbon-cost pass-through and linking new industrial demand with clean electricity supply.

To accelerate industrial decarbonisation while reducing unnecessary transmission expansion, Republic of Korea could institutionalise timely access to low-carbon electricity and grid capacity as an explicit, verifiable and meaningfully weighted criterion in siting assessments for major new

industrial parks. As illustrated by the proposed Honam semiconductor cluster, formalising this consideration across industrial siting decisions could help local governments to attract low-carbon energy investment and better align industrial demand with available power supply.

To further strengthen the effectiveness of carbon-price signals, progressive extension of carbon-cost pass-through into all regulated retail electricity tariffs should be considered. This would allow carbon costs to influence end-user decisions more directly. Potential distributional impacts can be addressed through targeted support for low-income and energy-vulnerable households.

8. Outlook

Over the past decade, Republic of Korea has built mature institutional foundations for emissions trading, MRV, and industrial and power-sector transition. The period to 2030 will test whether these institutions can provide a credible longer-term carbon signal and translate policy ambition into actual investment and emissions reductions. For other manufacturing-intensive Asian economies that are developing or deepening carbon markets, Republic of Korea exemplifies challenges that can emerge once the basic market architecture is in place. Its experience is more useful for informing implementation than as a model to replicate.

As a result, future CJK–Southeast Asia cooperation should focus on improving practical interoperability and building shared implementation evidence. Compatible MRV and methodologies, stronger product-level carbon accounting, workable Article 6 procedures, and shared evidence on how policy designs perform in different contexts can provide concrete starting points. Republic of Korea can contribute its accumulated implementation experience while also learning from different institutional and market conditions across China, Japan and Southeast Asia.

"The period to 2030 will test whether these institutions can provide a credible longer-term carbon signal and translate policy ambition into actual investment and emissions reductions."

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INDONESIA

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1. Key messages

Indonesia is building on the experience from its power-sector's emission trading system (ETS) to develop a broader carbon-market framework. Building on its existing monitoring, reporting and verification (MRV) infrastructure and pilot experience, Indonesia introduced Southeast Asia's first national-level mandatory, intensity-based ETS for the power sector in 2023. It is now reforming its national carbon-market framework, by revising the power-sector ETS and developing carbon-trading regulations for additional sectors. With power-sector allowance allocation suspended since 2025, the key test is whether the revised system can restore predictable compliance and establish a meaningful carbon-price signal through progressively tighter emissions constraints that are aligned with Indonesia's nationally determined contribution (NDC).

Translating ambitious low-carbon power plans into operating capacity remains a major challenge. Previous renewable energy expansion targets have fallen short, and much of the new planned capacity is scheduled for later years and relies heavily on independent power producers (IPPs). Renewable electricity purchase-price ceilings, contractual risk allocation, insufficient project preparation and grid delays continue to constrain project bankability and timely delivery. Overcoming these barriers will be critical to ensuring that low-carbon power becomes available when needed.

Rapid industrial expansion makes today's investment decisions critical to long-term decarbonisation. Indonesia is developing industrial decarbonisation roadmaps and transition support measures towards its 2050 industrial net-zero target. However, major investments in manufacturing and mineral processing are already proceeding before a predictable long-term carbon-price signal has emerged. Current investment in nickel smelting and associated captive coal generation illustrate the risk of locking in high emissions for decades. The challenge is to ensure that future carbon costs and feasible low-carbon alternatives inform new investment decisions, while still addressing the financing, technology and energy-supply constraints on low-carbon investment.

Indonesia's economic opportunities and substantial mitigation potential create opportunities for deeper cooperation with China, Japan and Republic of Korea. Developing stable, long-term partnerships through existing or new channels could translate growing economic and carbon-market cooperation into sustained transition investment and actual mitigation finance, while also offering valuable lessons for other Southeast Asian member states.

2. Context and baseline

Carbon emission profile

Indonesia's total greenhouse gas emissions (GHG) were approximately 1,495.6 million tonnes of carbon dioxide equivalent ($MtCO_2e$) in 2024, of which net emissions from Forest and Other Land Use (FOLU) were approximately 352 $MtCO_2e$. [1] [2] FOLU is a material component of Indonesia's national emissions profile, but emissions vary substantially from year to year due to deforestation, land-use change, drained peatlands and fires, ranging from about 1,278 $MtCO_2e$ in 2015 to 301 $MtCO_2e$ in 2022. [2] However, this brief focuses on how carbon pricing translates into investment and mitigation decisions in the power and industrial sectors, so FOLU is excluded from the scope of analysis.

Excluding FOLU, Indonesia emitted an estimated 1,143.7 $MtCO_2e$ in 2024. Power generation accounted for an estimated 316 $MtCO_2e$ (27.6 per cent) and industry for 311.7 $MtCO_2e$ (27.3 per cent), together representing about 55 per cent of national emissions. Industrial emissions comprised 235.9 $MtCO_2e$ from manufacturing fuel combustion and 75.8 $MtCO_2e$ from industrial processes and product use (IPPU). [2] The power sector remains heavily dependent on coal. Coal-fired generation rose from 174 terawatt hours (TWh) in 2019 to 228 TWh in 2024, accounting for about 61 per cent of total power generation in 2024. [3]

National climate policy

Indonesia targets peak emissions by 2030 and net zero by 2060 or sooner. The 2025 Second NDC shifts from reduction targets based on business as usual (BAU) to absolute emissions pathways benchmarked against 2019 emissions. It presents two low-carbon pathways based on different economic-growth assumptions: the low growth projection (LCCP_L) is based on 6.7 per cent growth annually by 2035, and the high growth projection (LCCP_H) is based on 8.3 per cent growth. Based on these two projections, 2035 emissions in the first scenario will be about 1,258 $MtCO_2e$ and 1,489 $MtCO_2e$ in the second scenario. [4]

"Rapid industrial expansion makes today's investment decisions critical to long-term decarbonisation."

"Having launched Southeast Asia's first power-sector intensity-based mandatory ETS in 2023, Indonesia is an early mover in the Association of Southeast Asian Nations' (ASEAN) mandatory carbon pricing and carbon-market infrastructure."

Implementation is distributed across sectoral institutions and planning frameworks. The 2025 National Energy Policy (Kebijakan Energi Nasional, KEN) targets a new and renewable energy share in primary energy supply of 19 to 23 per cent by 2030, 36 to 40 per cent by 2040 and 70 to 72 per cent by 2060. [5] The state-owned utility PT Perusahaan Listrik Negara (PLN) outlines its ten-year power-sector investment and capacity-expansion plan in the Electricity Supply Business Plan 2025–2034 (Rencana Usaha Penyediaan Tenaga Listrik, RUPTL). The plan forecasts 69.5 gigawatts (GW) of new generation and storage capacity by 2034, around 76 per cent of which will be renewables and storage. [6] For industry, the government has set a 2050 net-zero target, ten years ahead of the national target, and is developing decarbonisation roadmaps for nine priority subsectors, including cement, fertilisers, metals, chemicals, and pulp and paper. [7]

Regional positioning

Having launched Southeast Asia's first power-sector intensity-based mandatory ETS in 2023, Indonesia is an early mover in the Association of Southeast Asian Nations' (ASEAN) mandatory carbon pricing and carbon-market infrastructure. [8] The Indonesian system requires industrial companies and industrial-estate operators to report GHG emissions through Sistem Informasi Industri Nasional (SIINas), a preliminary data foundation for potential future ETS expansion. [9]

Indonesia's mitigation potential has attracted growing cooperation from partners in China, Japan and the Republic of Korea (CJK). These include Japan's long-standing project-based crediting and transition engagement as well as more recent bilateral cooperation with Republic of Korea and China. In 2023, Indonesia also launched the carbon trading platform IDXCarbon, and in 2025, the exchange opened to international trading of Indonesian carbon credits.

3. State of the emissions trading system and the carbon market

In 2021, Presidential Regulation (PR) 98/2021 established Indonesia's national Carbon Economic Value framework (Nilai Ekonomi Karbon, NEK). It identified carbon trading, results-based payments and carbon levies as instruments to support the NDC, [10] but it left detailed implementation to sector ministries. The power sector was the first to introduce mandatory emissions trading, following a 2021 pilot for coal-fired power plants. Ministry of Energy and Mineral Resources (MEMR) Regulation 16/2022 established three implementation phases: Phase 1 (from 2023 to 2024), Phase 2 (from 2025 to 2027) and Phase 3 (from 2028 to 2030). [8] Phase 1 commenced in 2023. However, power-sector allowance allocation has been on hold since 2025. Trading rules are now being revised under PR 110/2025, which replaced PR 98/2021 in October 2025. [11]

Coverage and allocation

Indonesia's operational ETS experience is concentrated in the power sector. The scheme was designed around an intensity-based benchmark system rather than an absolute emissions cap. Plant-type emissions-intensity benchmarks (PTBAE, tCO_2e per MWh) and historical generation were used to determine facility-level allowances (PTBAE-PU). This design reflected Indonesia's electricity-market structure, in which the state-owned utility PLN plays a central role in dispatch and power procurement. This limits individual generators' control over electricity output. As a result, the system places greater emphasis on emissions efficiency than on absolute emissions reductions. During Phase 1, allowances were allocated free of charge, and coverage reached 146 power-generation installations by 2024. [10] Phase 2 began in 2025 and envisaged expansion to 563 installations, [10] including gas-fired and off-grid coal-fired power plants. However, with allocation on hold, covered entities remain subject to emissions reporting.

Trading and Phase 1 compliance

During Phase 1, covered installations reported annual emissions through APPLE-Gatrik. These were then verified by a third party. [10] Under the original rules, compliance could be met using PTBAE-PU allowances or eligible domestic emission-reduction credits (SPE-GRK) with no quantitative limit on offset use. Trading could take place directly between participants or through IDXCarbon, launched in September 2023. In practice, power-sector allowance trading was conducted primarily through direct transactions, while exchange activity was concentrated in credits. [12] [10] Reported allowance transaction prices in 2024 ranged from approximately IDR 10,000 to IDR 30,000 ($0.6-1.7) per tCO_2e. [13] A carbon levy, originally envisaged as a monetary compliance backstop with a statutory minimum rate of IDR 30,000 per tCO_2e, has not been implemented; instead, non-compliance was penalised through reductions in the following year's allowance allocation. [10]

Reform direction under the new framework

PR 110/2025 introduces a national Carbon Allocation (Alokasi Karbon). This was jointly determined by relevant ministries and linked to sectoral emissions limits and facility-level GHG emission quotas (***kuota emisi GRK***). [11] Building on this framework, Indonesia is developing sector-specific carbon-trading regulations, including for industry. However, implementation is progressing at different speeds across sectors. For example, waste-sector rules entered into force in August 2026. [14] The framework also provides for cross-sector trading as sector-specific systems develop, but operational arrangements have not yet been established. PR 110/2025 also creates a carbon-tax obligation for regulated installations that have exceeded their emissions limits, with implementation subject to separate tax regulations. [11] As part of this broader regulatory reform, MEMR is revising the power-sector ETS rules to expand coverage and strengthen compliance. The proposed revisions envisage progressively broader coverage of fossil-fuel power plants and tighter allowance allocation. The precise timetable, exemptions and limits on offset use remain subject to the final sectoral regulations.

"The government is strengthening the institutional foundations for energy transition and renewable energy investment."

4. Industrial decarbonisation and energy transition linkages

Indonesia's existing power-market structure affects the extent to which the renewable generation and energy storage capacity planned under RUPTL 2025–2034 can be realised. Several pricing and contractual arrangements shape this transition. Renewable electricity purchase-price ceilings under PR 112/2022 help PLN manage procurement costs, but they may also constrain project bankability if the ceilings are insufficient to cover investment costs and required returns. [15] Another factor affecting the expansion of renewables is the cap on coal prices for public generation that is covered by the Domestic Market Obligation (DMO) framework. While this lowers fuel costs for PLN and coal generators, it also weakens renewables' relative competitiveness. In addition, regulated electricity tariffs and government compensation can buffer higher generation costs, weakening carbon-cost pass-through. Finally, long-term power purchase agreements (PPAs) with IPPs could also limit flexibility in shifting the generation mix toward lower-carbon power. Changes to existing PPAs may require renegotiation, compensation, and financing, while the transition towards lower-carbon generation will need to account for replacement power and system reliability. The expansion of industrial off-grid captive coal generation, which operates outside PLN's power procurement framework, poses an additional constraint. Its installed capacity has increased rapidly from approximately 10.4 GW in 2023 to 19.3 GW in 2025. [16]

Despite these challenges, the government is strengthening the institutional foundations for energy transition and renewable energy investment. These include reforms to renewable energy PPA regulations. For example, MEMR Regulation 5/2025 aims to reduce contractual uncertainty in renewable power procurement. [17] Moreover, the envisioned power-sector ETS and carbon tax will also provide carbon-cost signals over the longer term. International transition-finance initiatives, including the Just Energy Transition Partnership (JETP) and the Asian Development Bank's (ADB) Energy Transition Mechanism (ETM), [18] also support the shift towards low-carbon power generation. The share of new and renewable energy in national primary energy supply increased from 14.6 per cent in 2024 [19] to 15.7 per cent in 2025. [20] The extent to which the planned transition materialises will ultimately depend on the relative strength of these opposing forces.

In industry, the direction of new investment matters as much as the transition of existing assets. Rapid growth in manufacturing and mineral processing means that today's investment decisions could shape long-term industrial emissions before industrial ETS rules and low-carbon alternatives are fully developed. In nickel smelting, for example, expanding capacity has been accompanied by growing captive coal generation, [16] making low-carbon production dependent not only on carbon pricing but also on reliable low-carbon power from grid connections, renewables and storage. Other sectors face different constraints. In steel, the availability of lower-emissions routes such as electric arc furnaces (EAFs) and project bankability are primary issues. In cement, demand for low-carbon products that can support recovery of deep-decarbonisation costs hinders uptake. For textiles, small and medium-sized enterprises (SMEs), access to finance and implementation capacity present hurdles. Carbon pricing can provide a common cost signal, but investment responses depend on sector-specific conditions, including low-carbon power availability, technology pathways, firms' investment capacity, financing conditions and product markets. The effectiveness of the planned industrial ETS will therefore depend not only on a credible carbon-price signal but also on feasible options for firms to respond to that signal.

"With substantial mitigation potential, Indonesia is expanding its role as an international carbon-credit supplier."

5. Regional cooperation, CBAM exposure and Article 6

CBAM exposure and response

The European Union (EU) Carbon Border Adjustment Mechanism (CBAM) entered its definitive phase in 2026. Indonesia's direct exposure remains limited because major energy-intensive exports are largely directed to non-EU markets such as China. Although firms exporting CBAM-covered products, such as iron and steel, and aluminium, to the EU will face direct impacts, CBAM allows carbon prices actually paid in the country of origin to be deducted from the obligation. [21] Indonesia's mandatory ETS, however, still applies mainly to power, so sectors such as iron and steel and aluminium are not yet subject to full compliance obligations, and the carbon levy remains unimplemented. Domestic carbon costs currently deductible by Indonesian exporters are therefore limited.

As carbon pricing expands into industry, firms will need to calculate and document carbon costs actually paid. SIINas-based emissions reporting and MRV provide facility-level data, but CBAM requires product-level embedded emissions. Additional methodologies and verification capacity are therefore needed to allocate emissions from electricity, fuels, industrial processes and intermediate inputs to individual products. [9, 21]

Article 6 and credit readiness

With substantial mitigation potential, Indonesia is expanding its role as an international carbon-credit supplier. In January 2025, IDXCarbon began international sales of domestic emission-reduction credits (SPE-GRK). [22] PR 110/2025 subsequently clarified the legal basis for international transfers and corresponding adjustments, [11] although further subsidiary regulations are still needed to operationalise the framework. The Carbon Unit Registry System (SRUK), operational since July 2026, enables registration and transfer of domestic and international carbon units and processing of corresponding adjustments. [23]

As of September 2026, Indonesia had 40 Article 6.2 activities and 14 host-country-approved Article 6.4 activities, indicating a sizeable pipeline. However, no Internationally Transferred Mitigation Outcomes (ITMOs) had yet been transferred or received. [24] The next test is whether this institutional framework and project pipeline can translate into actual high-integrity Article 6 transfers.

Regional cooperation

Indonesia's cooperation with CJK spans policy exchange, transition investment and carbon-credit implementation. With Republic of Korea, the government-to-government Knowledge Sharing Program (KSP) has supported policy and institutional advisory work, while a bilateral Memorandum of Understanding (MOU) provides a framework for joint mitigation projects and potential ITMO transfers. [25] With China, the Two Countries, Twin Parks initiative has linked industrial parks since 2021 to support joint ventures, supply-chain integration and new investment. [26] With Japan, the Joint Crediting Mechanism (JCM) has supported low-carbon projects, MRV and credit issuance since 2013, reinforced by a mutual recognition arrangement in 2024. [27]

Regional cooperation is also advancing. The Japan-led AZEC-DCM provides a platform for regional carbon-market policy dialogue among Southeast Asian member states, Japan and Australia, [28] while the ASEAN Common Carbon Framework (ACCF) supports methodology recognition and market-infrastructure interoperability. [29] Indonesia can exchange practical experience with CJK partners to address its policy and investment priorities. Moreover, as the first ASEAN country to operate a national mandatory ETS, Indonesia can share its ETS implementation experience and lessons with other Southeast Asian member states.

6. Challenges and gaps

The carbon market framework has yet to establish predictable compliance and sufficiently binding emissions constraints to deliver a meaningful carbon-price signal aligned with the NDC.

The suspension of allowance allocation during the 2025 regulatory reforms showed that legal and trading infrastructure alone cannot sustain compliance demand unless allowance issuance, trading, surrender and enforcement follow a predictable cycle. At the same time, current technology-specific intensity benchmarks for power generation have not created sufficient scarcity relative to actual emissions, thereby keeping carbon prices low. PR 110/2025 now provides a framework linking national carbon allocation, sectoral mitigation targets and emissions limits. The next challenge is to translate this framework into both progressively tighter ETS allocations and clearer mitigation contributions from ETS-covered sectors.

The power sector faces persistent challenges in delivering planned low-carbon investments, alongside growing carbon lock-in risks.

Under the previous RUPTL 2021–2030, only around 25 per cent of renewable capacity additions targeted by 2024 had been realised. [30] The new RUPTL 2025–2034 expands renewable and storage investment plans, but around 46 per cent of planned new generation and storage capacity from 2025 to 2029 remains fossil-based. Around 70 per cent of planned renewable additions are scheduled for the period from 2030 to 2034. [31] With around 71 per cent of planned new generation expected to be developed through IPPs, [6] both long-term project bankability and timely delivery remain critical challenges. Despite recent PPA reforms, [17] investors continue to raise concerns about the adequacy of renewable electricity purchase-price ceilings and contractual risk allocation. Timely delivery is further constrained by delays in grid infrastructure development and insufficient project preparation—including feasibility studies and site readiness—prior to PLN's tendering and procurement processes.

New industrial investments risk locking in high emissions.

Indonesia is developing decarbonisation roadmaps for nine major industrial subsectors and preparing to expand carbon trading to industry, but investment in manufacturing and mineral processing is already proceeding ahead of a predictable, binding long-term carbon-price signal. For example, nickel smelting and processing illustrate the timing risk because new industrial facilities and captive coal generation can lock in high emissions for decades. [16] While constraints differ across subsectors, the central concern is whether future carbon costs, expected emissions, feasible low-carbon alternatives and clean-power availability are adequately considered before major investment commitments are made. Sector-specific financing, technology and market-demand constraints further determine whether these alternatives can be adopted.

Across these three challenges, international carbon-market cooperation faces an implementation test. Subsidiary regulations, coordination across ministries, credit integrity and buyer demand will determine whether projects in the Indonesian Article 6 pipeline translate into authorised transfers and actual mitigation finance.

7. Policy recommendations

International cooperation, including with CJK partners, can support implementation through promoting industrial MRV and product-carbon accounting, carbon-market operation and developing high-integrity Article 6 transactions that mobilise mitigation finance.

Restore ETS continuity and link allowance tightening to actual emissions and the NDC.

The revised power-sector ETS rules should avoid repeating the 2025 interruption by specifying how allowance allocation, compliance obligations and deadlines will be maintained or adjusted during future regulatory changes. Before each allocation period, expected allowance supply should be assessed against projected emissions and the sector's contribution to the NDC. Subsequent reviews should compare allowances issued with verified emissions and credit use. These will determine whether benchmarks need further tightening. Industrial ETS expansion should be conditional on adequate emissions data, verification capacity and feasible mitigation options.

To pursue a more ambitious pathway, Indonesia could consider moving towards a declining absolute emissions cap and broader auctioning as implementation becomes more reliable. These would be supported by assessments of sectoral mitigation potential and economic impacts.

Remove the barriers preventing planned low-carbon power projects from being delivered.

PLN and MEMR should strengthen project preparation before tendering. This should include site readiness and grid-requirement analyses. Establishing clearer procurement schedules will reduce delays. Renewable electricity purchase-price ceilings and PPA risk allocation should be reviewed against actual investment costs and financing conditions, while maintaining affordability and reliability. RUPTL implementation should track whether planned renewable, storage and grid projects progress to operation, identify delayed projects and assess which investments scheduled for later years could feasibly be brought forward. Uncommitted fossil-fuel projects should also be reassessed against updated demand, reliability and long-term emissions objectives.

Over time, Indonesia could progressively replace rigid renewable electricity purchase-price ceilings with more transparent, competitive pricing arrangements that better reflect project costs and investment risks.

Strengthen industrial investment screening and public support conditions to align new investments with the 2050 industrial net-zero pathway.

The Ministry of Industry should build on existing decarbonisation roadmaps to establish sector-specific screening criteria for assessing the projected emissions and long-term mitigation pathways of major new industrial investments. Building on existing environmental permitting and sustainable-finance classification frameworks, relevant public support institutions should require credible mitigation plans from new industrial projects seeking tax incentives, policy finance or public infrastructure support. This is especially important for projects with substantial carbon lock-in risks. These plans should specify projected emissions, feasible low-carbon technology alternatives and phased implementation milestones. Project developers should demonstrate the economic viability and feasibility of low-carbon alternatives, including through sensitivity analysis of future carbon-price scenarios. Public support should depend on additional mitigation benefits, verifiable implementation milestones and private-sector cost sharing. Priority should be given to investments with significant long-term carbon lock-in risks, particularly nickel smelting.

Once sector-specific emissions standards and verification systems are sufficiently developed, Indonesia could extend these requirements to existing permitting processes for major new industrial projects. Projects unable to demonstrate a credible pathway to meeting binding emissions standards, even after an opportunity to revise their plans, could face deferred or denied approval.

8. Outlook

Indonesia has gained practical experience in operating a power-sector ETS and is now developing a broader, more integrated carbon-pricing framework. At the same time, rapid economic and industrial expansion is driving substantial investment in long-lived assets, even as the country targets industrial net zero by 2050. This makes the coming years particularly consequential: whether the evolving framework can establish a credible and predictable carbon-price signal, and whether that signal can translate into timely low-carbon investment in the power and industrial sectors, will be critical to achieving Indonesia's long-term climate objectives.

Indonesia's economic opportunities and substantial mitigation potential have attracted growing engagement from China, Japan and Republic of Korea. Building on these relationships and developing stable, long-term transition partnerships—whether through existing mechanisms or new approaches—could help translate this engagement into sustained investment and implementation support. If successful, Indonesia's experience could provide a valuable model for other Southeast Asian member states seeking to develop carbon markets alongside economic and industrial growth.

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1. Key messages

The Philippines has laid important groundwork for establishing an emissions trading scheme and now needs to implement it as part of a comprehensive carbon markets plan. The designation of the Department of Environment and Natural Resources (DENR) as the carbon market authority marks progress. However, the Low Carbon Economy Investment Act (LCEIA) remains pending in the Senate. The priority should be passing the LCEIA and implementing a credible, well-designed emission trading system (ETS) through a phased rollout.

An initial carbon charge on electricity and some industrial sectors may be implemented. This would sensitise industry to the concept, generate initial actual behavioural data and stop potential revenue leakage to overseas carbon border adjustment mechanism (CBAM) charges. These charges would also offer incentives for industries to distinguish between high- and low-emission pathways. The charge could be folded into the ETS once the system is live and operational.

Article 6 opportunities need clear rules to protect the nationally determined contribution (NDC). Consequently, an NDC-aligned framework for authorising international carbon transfers should be introduced. The framework should be based on a forward-looking assessment of NDC requirements, sectoral mitigation pathways and the cost and availability of domestic abatement. It should also clarify how activities under independent carbon standards interact with NDC accounting.

2. Context and baseline

Carbon emission profile

Coal and natural gas provide around three quarters of the Philippines' power supply, and the continued increase in greenhouse gas (GHG) emissions reflects this continued dependence on fossil fuel-based electricity generation. [2] GHG rose from 198.7 million metric tonnes of carbon dioxide equivalent ($MtCO_2e$) in 2015 to 287.0 $MtCO_2e$ in 2025, excluding forestry and other land use (FOLU). [1] The power sector remains the country's largest source of emissions, contributing 47 per cent of total GHG emissions in 2025. Agriculture accounted for 21 per cent of emissions, followed by transport (16 per cent), waste (12 per cent), and industrial processes and product use (5 per cent).

National climate policy

The Philippines submitted a new NDC on 8 September 2026. It committed to a 75 per cent reduction and avoidance of GHG emissions against projected business-as-usual (BAU) emissions from 2025 to 2035, including FOLU. [3] This target comprises a 7 per cent unconditional component and a 68 per cent conditional component. FOLU is projected to act as a net carbon sink during this same period. The NDC sets no absolute emissions cap or peaking year, and sector-level details are forthcoming.

"The priority should be passing the LCEIA and implementing a credible, well-designed emission trading system (ETS) through a phased rollout."

3. State of the emissions trading system and the carbon market

Compliance market

The Philippines has not implemented a domestic carbon tax or mandatory GHG emissions trading system. Efforts to introduce compliance carbon pricing have centred on the proposed Low Carbon Economy Investment Act, which is also known as House Bill (HB) 11375. It passed the House of Representatives on third reading in June 2025 and has been approved by the Senate committee, but the Senate has not passed it yet.

Six carbon pricing bills (HBs 2055, 3685, 3820, 6407, 6890, 2481) and a separate Carbon Rights Bill (HB 1817) are currently pending. HBs 2055, 3685 and 3820 largely follow the ETS approach outlined in HB 11375, which is a "cap-and-invest" system covering large and medium emitters in energy, transport, industry, agriculture, forestry and waste. In this system, companies submit decarbonisation plans that the Climate Change Commission (CCC) uses to set allowances and the carbon price. An entity that exceeds its allowance is required to pay the CCC-set price for each excess tonne into a decarbonisation fund, which can be spent on emissions reductions within or beyond its value chain, transferred to government climate programmes or used to buy surplus allowances or domestic carbon offsets. HBs 6407 and 6890 build on this design, requiring the CCC to set emissions caps that are aligned with the goals of the Paris Agreement, to apportion the economy-wide cap across industries based on their specific circumstances, and to review emissions caps at least every five years.

HB 2481, on the other hand, proposes a conventional cap-and-trade system administered by the Department of Environment and Natural Resources (DENR), with allowance prices determined through auctions and market trading. This system has a phased transition from free allocation to full auctioning of emissions allowances over ten years.

Voluntary market

The voluntary carbon market is currently the most active segment of the Philippine carbon market, though it remains small and at an early stage by regional standards. As of October 2026, 42 projects were listed on Verra, Gold Standard and other crediting standards. Twenty-nine of these projects remained in the pipeline or under validation. [4] Approximately 1.5 million carbon credits had been issued to date across 6 projects, of which 679,000 had been retired.

The largest issuances came from the Caparispisan Wind Energy Project, the Negros Island Solar Power project and the AC Energy SolarAce1 project. The project pipeline, however, is shifting towards forestry, with reforestation and Reducing Emissions from Deforestation and Forest Degradation (REDD+) projects in Mindanao, Mindoro, Samar and Central Luzon.

Domestic regulation of nature-based projects is led by the DENR. Its Carbon Accounting, Verification, and Certification System (CAVCS) requires projects involving forest lands, protected areas, ancestral domains, and private lands to undergo approval, validation and certification processes. [5] In 2026, the DENR adopted the Roadmap to Readiness in the Voluntary Forest Carbon Market (2026-2030) to strengthen policy frameworks, enhance data analytics, improve MRV and carbon registry systems, build institutional capacity and establish sustainable financing mechanisms for forest carbon initiatives. [6] The DENR administrative order No. 2026-05 also outlined guidelines for future forest carbon credit projects: project proponents must be at least 60 per cent Filipino-owned; projects in ancestral domains require free, prior and informed consent; and local communities are entitled to a fair and equitable share of revenues. [7] The minimum share has not yet been set by the Forest Management Bureau and the National Commission on Indigenous Peoples. The order also established a public DENR Forest Carbon Credit Database, which complements the CAVCS.

In the energy sector, the Department of Energy's Circular No. DC2025-09-0018 established a framework for eligible project proponents to generate Carbon Credit Certificates, each representing one metric tonne of verified CO_2-equivalent emission reductions or removals. [8] Proponents may use, sell or transfer these credits in local or international markets. The circular also establishes rules for carbon credit ownership, transfer, verification and prevention of double counting.

"The voluntary carbon market is currently the most active segment of the Philippine carbon market, though it remains small and at an early stage by regional standards."

4. Industrial decarbonisation and energy transition linkages

The power sector and renewable energy

Power generation is the Philippines' largest source of emissions. In 2025, coal supplied 57 per cent of grid-connected generation, natural gas about 17 per cent and renewables about 25 per cent. Renewables were mostly derived from hydropower and geothermal. [2]

The Philippine Energy Plan 2023-2050 lays out the long-term roadmap for improving energy security, expanding renewable energy, and reducing reliance on fossil fuels. It targets a renewable share of 35 per cent of the power generation mix by 2030 and a share above 50 per cent by 2040. [9] Meeting this will require more than 106 gigawatts (GW) of new renewable capacity by 2050. To support this, the DOE has launched a 10-year Green Energy Auction Program offering at least 25 GW of additional renewable energy capacity through annual auctions until 2035. [10] However, grid constraints, high capital cost and slow land acquisition remain key barriers.

In June 2026, the average power price reached PHP 12.43 per kilowatt-hour (kWh) in the Philippines, the highest in Southeast Asia. [11] Suppressing the carbon cost pass-through with price caps or free allocation to generators would weaken the price signal and risk windfall profits. The existing lifeline rate under Republic Act 11552 gives low-income and Pantawid Pamilyang Pilipino Program households discounts of up to 100 per cent on consumption below 50 kWh. However, it is currently financed by other consumers, [12, 13] and none of the leading bills explicitly earmarks carbon revenue for energy affordability. Without credible revenue recycling, public resistance could weaken or delay the price signal.

Carbon credits and early coal retirement

The DOE's carbon credit circular lists early coal retirement as an eligible activity, and carbon finance is already being tested for closing coal-fired power plants. In November 2022, the energy company ACEN completed an Energy Transition Mechanism (ETM) transaction, fully divesting its interest in South Luzon Thermal Energy Corporation (SLTEC) and setting a 2040 retirement date for the 246 MW coal plant. That is about 15 years earlier than the plant's assumed 50-year technical life. ACEN received PHP 7.20 billion from the divestment and these proceeds will be recycled for renewable-energy investment. The PHP 17.40 billion transaction comprised PHP 13.70 billion of debt from the Bank of the Philippine Islands and Rizal Commercial Banking Corporation and PHP 3.70 billion of equity from the Government Service Insurance System, Insular Life and ETM Philippines Holdings Inc (a special purpose vehicle). [14] Option agreements gave ACEN call rights, and the investors put rights under pre-agreed conditions. These options support the planned 2040 retirement and the transition to cleaner technology.

In August 2024, ACEN, the global asset manager Keppel and the Temasek-founded investment platform GenZero signed a Memorandum of Understanding to study using carbon transition credits for the early retirement of the SLTEC plant. Under the proposal, the plant would be replaced by an integrated renewable-energy and storage system. Mitsubishi Corporation and Diamond Generating Asia joined in May 2025, broadening access to Japanese carbon market demand. The proposal makes SLTEC an important test case for whether carbon-credit revenues can enable earlier coal retirement while supporting replacement clean power and a just transition for affected workers and communities. Verra's VM0052 methodology, under its Verified Carbon Standard (VCS) Program, provides a framework for crediting such activities. [30] These arrangements are encouraging but remain exploratory.

Industry

Cement and steel are the most carbon-intensive sectors and the likeliest early targets for a compliance carbon price. The Philippine Cement and Concrete Industrial Decarbonisation Roadmap aims to cut the clinker ratio from about 75 per cent in 2024 to 58 per cent by 2050, and to raise the share of alternative fuels and renewable energy from 13 per cent in 2024 to 36 per cent by 2050. [15]

The steel sector is expanding rapidly, using different technologies with varying emissions. Blast furnaces emit around 2.34 tonnes of carbon dioxide (CO_2) per tonne of steel, whereas scrap-based electric arc furnaces (EAF) emit only 0.69 tonnes. [16] Both methods are used by proposed new investments such as Panhua's planned 10-million tonne integrated complex in Sarangani [17] and Steel Asia's renewable-powered EAF facility in Batangas [18]. The industry's roadmap for 2026 to 2040 projects steel demand more than doubling to 21.4 million tonnes by 2040. [19] However, the absence of a carbon price or low-carbon procurement standards means that existing incentives do not differentiate between high- and low-emission production.

"The proposal makes SLTEC an important test case for whether carbon-credit revenues can enable earlier coal retirement while supporting replacement clean power and a just transition for affected workers and communities."

5. Regional cooperation, CBAM exposure and Article 6

CBAM exposure and response

The European Union is the Philippines' fourth-largest export destination and receives approximately 9 per cent of its CBAM-covered exports. In 2024, these totalled around 6,900 tonnes, mainly screws, nuts, bolts and construction structures made from long steel. [20] Estimated CBAM costs are around $263,000 in the absence of a recognised domestic carbon price.

Future expansion of CBAM coverage into additional sectors, particularly organic chemicals and polymers, could create greater cost exposure due to their higher emissions intensity. In addition, indirect emissions from electricity consumption could become increasingly relevant given the Philippines' relatively carbon-intensive power grid. The inclusion of new sectors would also increase total CBAM liabilities by approximately $2.50 million, while indirect emissions could add a further $884,000 in costs before accounting for any carbon price already paid domestically. [20]

With current exposure modest, a more practical near-term focus would be building the data foundations that CBAM compliance requires. This includes product-level emissions monitoring and reporting, access to EU-accredited verification, a better understanding of the carbon intensity of export-oriented supply chains, and early engagement with exporters on what a broader CBAM could mean for them.

Article 6 opportunities and challenges

The Philippines is positioned as a supplier of carbon credits under Article 6 of the Paris Agreement. In April 2026, it signed its first Article 6.2 Implementation Agreement with Singapore. Under this agreement, Singapore will channel 5 per cent of proceeds to Philippine adaptation and cancel 2 per cent of credits at issuance to ensure a net reduction in global emissions. [21] The DOE's carbon credit framework and the DENR's forest carbon rules provide the basis for generating credits from energy and nature-based projects.

However, credit readiness remains limited. Detailed application procedures under the Singapore agreement have not yet been published, and no Letter of Authorisation has been publicly reported. [4] As a result, only six of the 42 Philippine projects registered or in process have issued credits. Executive Order 127, issued in October 2026 and directing DENR to develop a national carbon market policy framework and to establish a national carbon registry, is a step in the right direction and could lead to more positive developments on this front.

Regional cooperation

The Philippines has been part of Japan's Joint Crediting Mechanism since 2017. It has both registered solar projects and rice methane projects under validation. [22] It also has 33 Asia Zero Emission Community (AZEC) agreements, many focused on agriculture and land-use credits. [23] These partnerships can mobilise finance and expertise.

6. Challenges and gaps

No compliance demand and design weaknesses in the leading bills

Without a compliance obligation in force, there is insignificant domestic demand for carbon credits. The LCEIA remains pending in the Senate, with the 20th Congress running until 2028, and the other leading bills also have significant design weaknesses. Another concern is that allowances are based on enterprises' own decarbonisation plans, which departs from standard practice in established schemes. The price set by the CCC could also act as a de facto ceiling on allowance prices, weakening the price signal. In addition, allowing companies to fully offset their emissions may undermine effort on real abatement.

Fragmented governance and unclear carbon rights are being addressed

Multiagency involvement is common in carbon market governance, and the announcement of the DENR as the nodal carbon market agency provides much needed clarification. Currently, the DENR's CAVCS issues its own forest carbon certificates using domestically accredited verifiers [24], while the DOE's Carbon Credit Certificate [25] framework accredits its own verifier and provides for DOE authorisation of internationally transferred credits. Executive Order 127 requires existing projects to move to a single national registry once it becomes operational, but until then, these parallel certificates and procedures may create investor uncertainty.

Much of the country's credit potential lies in forests, where private lands, community-based forestry areas and ancestral domains often overlap. HB 1817, which would define the ownership, transfer and benefit-sharing of carbon credits, has not been enacted. Minimum community benefit-sharing under DAO 2026-05 has not yet been set by the DENR and the National Commission on Indigenous Peoples. [7] Care needs to be taken to ensure it does not conflict with the Local Government Code, which gives local government units a fixed share of natural resource revenue. [26]

Article 6 authorisation risks to the NDC

NDC 3.0 includes FOLU as a net carbon sink over the next ten years. It projects forests will absorb about 2,296 $MtCO_2e$ over this period. [1] At the same time, forestry dominates the country's new carbon project pipeline. The Philippines-Singapore Implementation Agreement opens a route for these credits to be transferred abroad. Many AZEC agreements signed with Japan between 2023 and 2025 also target agriculture and land use. Forest credits sold abroad with corresponding adjustments would directly reduce the sink relied on by the country's NDC. Higher compliance prices in markets such as Republic of Korea (around $22 per tCO_2e) [27] and Singapore (around $35 per tCO_2e) [28] may pull higher-quality supply abroad. Selling the low-cost abatement internationally and leaving the costlier options for future domestic compliance could undermine national targets.

7. Policy recommendations

Pass the LCEIA and phase in a well-designed ETS

The government could list the LCEIA as a priority measure to secure passage through Congress. Designating the DENR as the country's carbon markets authority and the order to draft a carbon market policy framework is a step in the right direction. This needs to be followed by implementing an ETS in phases, particularly for the electricity and industrial sectors. An initial pilot phase would require large emitters to report verified emissions before compliance obligations apply. A narrow initial scope would ease implementation. The ETS should use an absolute, declining cap, anchored by credible sectoral pathways defined by the CCC. Offset use should be limited, in line with comparable schemes.[29] A modest starting price, free allocation in the initial phase and a published schedule for moving to auctions would give businesses time to adjust. Part of the carbon revenue could be earmarked to fund the lifeline rate under Republic Act 11552, which is currently financed through a surcharge on other consumers' bills. It could also fund targeted cash transfers to low-income households that the lifeline rate does not reach.

"Clearer and stronger Article 6 rules will also be essential to ensure that a growing supply of carbon credits does not come at the expense of the country's NDC."

Implement an interim carbon charge while the ETS is being planned and piloted

While the ETS is being planned and piloted, an initial carbon charge on electricity and some industrial sectors could be implemented. This would start the process of sensitising industry to the concept and generating initial actual behavioural data that can inform the policy design of the ETS when live. The charge could be very similar to those in the planned ETS and could focus on those sectors that will be affected by import CBAMs being implemented elsewhere. Social safeguard mechanisms similar to the lifeline charges are recommended to shield the lower economic strata from the costs.

Introduce an NDC-aligned framework for authorising international carbon transfers

The Philippines should develop a framework that governs which mitigation outcomes can be authorised for international transfer. Such a framework would be based on a forward-looking assessment of NDC requirements, sectoral mitigation pathways and the cost and availability of domestic abatement. This is particularly important for forestry given the sizeable forest sink projects in NDC 3.0. The DENR could develop a quantified mitigation budget that distinguishes the outcomes needed to deliver the NDC from those potentially available for export. Periodic assessments will be necessary as emissions projections and mitigation performance change, with authorisations conditional on robust MRV and safeguards against double counting. The framework should also clarify how independent carbon crediting programs can serve corporate buyers and how their use affects NDC accounting, including when Article 6 authorisation and corresponding adjustments apply. Publishing authorisation procedures and eligible methodologies would give investors clarity and help the country benefit from early Article 6 demand.

8. Outlook

The Philippines has taken positive steps and laid important groundwork through NDC 3.0, new forest carbon rules and its first Article 6 agreement. However, rising power demand and rapid industrial expansion risk locking in high-carbon, long-lived assets without a carbon price to steer investment towards low-carbon technologies. With the 20th Congress ending in 2028, progress on LCEIA will be crucial to advancing carbon pricing. Clearer and stronger Article 6 rules will also be essential to ensure that a growing supply of carbon credits does not come at the expense of the country's NDC. Further delays on either front could hamper the Philippines' long-term climate objectives as well as competitiveness in new industries.

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THAILAND

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1. Key messages

Although Thailand has a foundation for an ETS, the compliance framework remains unrealised. The draft Climate Change Act provides for an emission trading system (ETS) operating under sector-specific emission ceilings aligned with the third generation of Nationally Determined Contributions under the Paris Agreement (NDC 3.0). It will be administered by the Department of Climate Change and Environment (DCCE) with National Committee on Climate Change (NCCC) oversight and builds on the experience and expertise gained from Thailand's decade-old Voluntary Emissions Trading Scheme (V-ETS) and Voluntary Emission Reduction (T-VER) program. However, the Act remains under legal review. Moreover, approximately 50 subsidiary regulations still need to be drafted. Consequently, a pilot is not anticipated before 2029. Timely enactment and a binding, phased roadmap, beginning with mandatory greenhouse gas (GHG) reporting, would provide the certainty required for investment planning.

Decisions on coverage, cap setting and allocation will largely determine the effectiveness of the ETS. Initial coverage should focus on power generation and a limited group of energy-intensive sectors. Predictability would be enhanced by an absolute, declining cap aligned with NDC 3.0, a benchmark-based free allocation phased towards auctioning on a published schedule, and a formal review after the data-collection period from 2027 to 2028. Allocation should be calibrated carefully: excessive free allocation would weaken the price signal, whereas insufficient protection could heighten carbon leakage and Carbon Border Adjustment Mechanism (CBAM) exposure.

A credible carbon price will depend on genuine allowance scarcity and robust offset rules. The THB 200 per tonne component of the fuel excise tax has not altered retail prices, and an estimated 20 million tonnes of carbon dioxide equivalent ($MtCO_2e$) of unused T-VER credits exceeds what the proposed 15 per cent offset limit could absorb. Offset eligibility should be restricted to Premium T-VER or equivalent high-integrity credits. In addition, the carbon tax should complement the proposed ETS on a predictable upward trajectory, and electricity tariffs should reflect the carbon tax. Revenue should be recycled through the Climate Fund to protect vulnerable households.

Monitoring, reporting and verification (MRV) systems and registry infrastructure should be in place before the data-collection period from 2027 to 2028. Facility-level data has not been tested at scale. Verification capacity is limited, and reporting is fragmented. Priority should be given to creating an integrated reporting platform, expanding verifier accreditation and integrating DCCE's allowance registry with the Thailand Greenhouse Gas Management Organization's (TGO) credit registry. Article 6 authorisations should be aligned with the ETS cap so that low-cost abatement is retained for domestic compliance.

2. Context and baseline

Carbon emission profile

Thailand's greenhouse gas emissions were 401.4 $MtCO_2e$ in 2025, excluding land use, land-use change and forestry (LULUCF). [1] Power generation was the largest single source, followed by transport, industrial processes, and combustion from industry and agriculture (notably rice cultivation and livestock).

The power system remains very dependent on fossil fuels. Based on August 2026 data, electricity generation was 63.5 per cent natural gas, 15.1 per cent coal, and 20.4 per cent renewables (hydropower and others). [2] The Electricity Generating Authority of Thailand (EGAT), the state utility, holds around 29 per cent of contracted capacity and minority stakes in major independent power producers. This gives the state a substantial, but not exclusive, role in dispatch and investment. [3]

Thailand's manufacturing- and export-oriented economy relies on energy-intensive, trade-exposed sectors such as petrochemicals, refining, cement, steel, automotive and electronics. Carbon pricing must decarbonise industry while protecting export competitiveness and managing cost-of-living concerns. [4]

National climate policy

Thailand ratified the Paris Agreement in September 2016 and has since progressed through successive NDC updates. Under NDC 2.0, Thailand committed to an unconditional 30 per cent reduction in emissions compared to business-as-usual (BAU) by 2030, rising to 40 per cent conditional on enhanced international support. NDC 3.0, submitted in November 2025, shifts to an economy-wide absolute target, cutting net GHG emissions by 47 per cent from 2019 levels to 152 $MtCO_2e$ by 2035. [5] It also brings forward Thailand's net-zero target by 15 years, from 2065 to 2050, aligning with a 1.5 °C pathway.

Thailand's climate policy is grounded in Strategy 5 (Eco-Friendly Growth) of the 20-Year National Strategy (2018–2037), which prioritizes GHG mitigation and adaptation,

"A credible carbon price will depend on genuine allowance scarcity and robust offset rules."

low-carbon transition, carbon sinks, and disaster risk management. This framework mandated the development of economic instruments, laying the groundwork for the draft Climate Change Act.

3. State of the emissions trading system and the carbon market

Compliance market

Thailand does not yet operate an ETS, but it does apply an explicit carbon price. In January 2025, the Cabinet approved a ministerial regulation embedding a carbon component of THB 200 (about $5.88) per tCO_2e within the existing excise tax on oil and petroleum products, with a provision for this rate to potentially rise to as high as $1000 per tCO_2e by 2050 under high-ambition global decarbonisation scenarios. [6] Excise rates were left unchanged, so the measure is revenue-neutral at the retail level. It uses product-specific emission factors and covers gasoline, gasohol, kerosene, jet fuel, diesel, biodiesel, liquefied petroleum gas and fuel oil. Any change to the rate requires Cabinet approval. This made Thailand the second ASEAN country after Singapore to implement an explicit carbon tax. [7]

The draft Climate Change Act was approved in principle by the Cabinet on 2 December 2025. It has 205 sections that are organised around four mechanisms: national policy-setting, climate-risk management and adaptation, GHG reduction, and the Climate Fund. [8] The draft Act also establishes four main committees led by a National Committee on Climate Change (NCCC) that will set national policy and targets and create a Climate Change Master Plan. The Department of Climate Change and Environment (DCCE) will supervise implementation and draft up to 50 subsidiary regulations covering detailed ETS regulations, carbon-credit market rules, and the MRV system. The Act includes penalties for failing to report or falsifying emissions data. [9] In May 2026, DCCE and the Office of the Council of State conducted a first reading of the bill.

The Act will also introduce several pricing instruments. A broader carbon tax will cover coal, oil, natural gas and other fossil fuels at rates reported up to THB 120 per tCO_2e. Payments will be deductible against ETS costs to avoid double charging. [10] The DCCE, under NCCC oversight, will manage the proposed ETS, which will operate under sector-specific emission ceilings aligned with NDC 3.0. Covered entities would surrender allowances matching their verified emissions each year. DCCE will also issue allocation plans every five years setting covered activities, caps, auction shares and limits on credit use. Under the current indicative timeline, a data-collection period would run from 2027 to 2028, with a pilot ETS potentially launching in 2029.

Revenue from allowance auctions and CBAM certificate sales can capitalise the Climate Fund, financing mitigation, adaptation and green research and development. The fund will be governed by a committee that includes government, private-sector and civil-society representatives. [11] DCCE estimates that investment of around THB 5 trillion is needed to meet Thailand's climate targets. The Fund is expected to cover only part of this, so private capital and international climate finance are also necessary. [12, 13]

Voluntary market

Thailand's voluntary carbon market is among the most mature in Southeast Asia. The Thailand Greenhouse Gas Management Organization (TGO), a public organisation established to promote national GHG management, administers the Thailand Voluntary Emission Reduction Program (T-VER), and oversees project registration, methodology approval and the accreditation of validation and verification bodies. [14] The T-VER program encourages voluntary domestic emissions reductions and builds the domestic carbon market in preparation for future compliance trading. A Premium T-VER applies stricter methodologies to meet higher-integrity buyer requirements, including for international transfers.

As of June 2026, cumulative T-VER issuance stood at 26.64 million tCO_2e, of which 51 per cent had been utilised while 9.6 per cent had been used for offsetting. [15] Cumulative trading reached about 5.13 million tCO_2e, valued at roughly THB 433 million ($12.9 million), at an average price of THB 84.4 ($2.5) per tonne. [16] TGO's market dashboard reported a weighted-average price of THB 39.33 per tonne across 64 transactions in June 2026. [17] TGO launched the "TGO Showroom" online marketplace in July 2025 to improve price transparency and lower search costs for smaller buyers and developers.

Thailand also has more than a decade of experience with cap-and-trade mechanics. TGO launched the Thailand Voluntary Emissions Trading Scheme (Thailand V-ETS) in 2013 to test MRV systems, cap-setting, allocation and trading infrastructure, and since 2021, it has piloted ETS-style mechanisms with the Eastern Economic Corridor

"Thailand's voluntary carbon market is among the most mature in Southeast Asia."

(EEC) Office. [18] The draft Act would link the voluntary and compliance markets by allowing covered entities to meet up to 15 per cent of their obligations with TGO-certified or other approved credits. The DCCE would set this limit in allocation plans, updated every five years, and the NCCC would issue eligible criteria for credits used for compliance. [19]

Corporate emissions data is also improving. The Stock Exchange of Thailand (SET) with DCCE and the Export-Import Bank of Thailand launched SET Carbon in 2025. It is a standardised carbon-footprint tool and was being used by more than 300 listed companies by September 2025. [20] It is now being extended to small and medium-sized enterprises through TMBThanachart Bank in order to link verified emissions to green lending. [21] Under the Securities and Exchange Commission's (SEC) International Sustainability Standards Board (ISSB) adoption roadmap, SET50 companies must disclose Scope 1 and Scope 2 emissions under International Financial Reporting Standards S2 Climate-Related Disclosures (IFRS S2) from financial year 2026. This will extend to all listed issuers by financial year 2029, with limited assurance from TGO-registered verifiers. [22, 23]

4. Industrial decarbonisation and energy transition linkages

Power sector and renewable energy targets

The power sector is the largest emissions source and the most tractable candidate for ETS coverage due to the relatively small number of large generating facilities. However, allowance costs interact directly with tariff-setting and dispatch, so ETS design choices will feed through to consumer prices. The Draft Alternative Energy Development Plan 2024-2037 (AEDP) targets 73 gigawatts (GW) of renewable capacity by 2037, up from 28 GW under the 2018 plan. The Draft Power Development Plan 2024 (PDP2024) envisaged renewables reaching 51 per cent of generation by 2037 and a full coal phase-out by 2050. [24] This will necessitate a sharp acceleration in renewable capacity as wind and solar together supplied less than 5 per cent of generation in 2023. [25] EGAT has committed not to build new coal plants beyond 2026 and targets full coal retirement by 2051, but there is no legally mandated phase-out date. [26]

New solar (from $33 to $75 per MWh) is already competitive with new gas or coal generation ($74 to $96 per MWh). [32] The main barrier is therefore not technology cost but contracted fossil capacity. A carbon price of THB 120 to 200 per tonne is too low to change the economics of existing long-term gas PPAs, so PPA reform, renewable procurement and grid investment will matter more than price alone in the near term.

Gas overcapacity and the next power plan

Power planning has been criticised for over-building gas capacity under long-term power purchase agreements (PPAs). The draft PDP2024 included about 6.3 GW of new gas capacity by 2037, which would have raised the share of imported liquefied natural gas in gas supply for power from about one third to over 43 per cent as Gulf of Thailand production declines. [29] The draft was shelved in 2025 amid criticism that it over-forecast demand and relied too heavily on imported LNG. [30]

In 2025, seven of eleven privately owned gas-fired plants operated at capacity factors below 10 per cent; these underused gas assets cost EGAT and ratepayers an estimated THB 159 billion ($5.02 billion) over three years. [27] In October 2025, the National Energy Policy Council suspended four power plants, including three gas-fired facilities totalling 4 GW. [28]

The Ministry of Energy is now drafting PDP2026, a 25-year plan for 2026 to 2050. The plan sets out four scenarios in which clean electricity reaches between 65 to 89 per cent of generation by 2050. [46] All four scenarios share the same build-out to 2037, including 24.3 GW of solar, 14.5 GW of battery storage, 9.1 GW of new gas capacity, 2.7 GW of wind and Thailand's first small modular reactor. [31] Average tariffs over the period from 2027 to 2050 are projected at THB 3.83 to THB 3.89 per kilowatt-hour (kWh), rising to THB 4.11 to THB 4.58 per kWh by 2050. [46] Tariff affordability is relevant to carbon pricing: if carbon costs cannot be passed through to tariffs, the price signal to generators will be muted. Until PDP2026 is adopted, Thailand continues to operate under PDP2018 Revision 1.

Industry

Cement, petrochemicals, refining, steel and aluminium are widely anticipated as early ETS candidates. These sectors face dual pressure from future domestic compliance costs and European Union (EU) CBAM exposure on exports, making early MRV readiness and emissions-intensity benchmarking commercially relevant regardless of the domestic timeline.

Cement has moved furthest. In May 2026, the Thai Cement Manufacturers Association (TCMA), working with DCCE, the Department of Industrial Works, United Nations Industrial Development Organization (UNIDO) and Environment and Climate Change Canada, launched a sector decarbonisation initiative centred on a mobile carbon capture unit piloted in the Saraburi Sandbox industrial cluster. [33] TCMA reports that clinker substitution has cut cumulative emissions by more than 3.8 $MtCO_2e$ since 2019, [34] although Thailand's clinker-to-cement ratio remains high at around 80 per cent. For cement and petrochemicals, deeper cuts will depend on carbon capture, utilisation and storage (CCUS), but this is not yet commercially viable at scale.

The key open design question is free allocation. DCCE's allocation plans will determine how generously trade-exposed industries are protected during the transition. Allocation that is too generous would undermine the price signal the ETS is meant to create, while too little could shift production abroad and increase CBAM exposure.

5. Regional cooperation, CBAM exposure, and Article 6

CBAM exposure and response

The EU CBAM definitive regime began on 1 January 2026. Authorised declarants will begin purchasing certificates in February 2027, covering 2026 imports. The first annual declaration and surrender is due by 30 September 2027. [35, 36] World Bank analysis finds that, of the sectors currently covered, only Thailand's iron and steel and aluminium exports to the EU are materially affected, accounting for under 0.03 per cent of GDP. Iron and steel are the most exposed because the emissions intensity of Thai exports exceeds that of most European producers. Industry estimates nonetheless put Thailand's aggregate annual CBAM-related exposure at around $500 million, or 0.2 per cent of GDP once certificate costs are incorporated. [37]

The draft Act's own CBAM is modelled on the EU scheme and requires importers of carbon-intensive goods to register with DCCE, and report embedded emissions to DCCE. Reporting suggests certificate payments may be waived for the first two years, and importers that have already paid a carbon price in the country of origin could claim deductions. [38] For Thai exporters, however, the more pressing issue is the EU CBAM on their own products. A credible domestic carbon price would allow more of that cost to be retained in Thailand rather than paid at the EU border.

Article 6 and credit readiness

Thailand is one of the most active participants in Article 6 of the Paris Agreement. It has established a governance framework for the implementation through the International Carbon Credit Guideline (ICCG). The framework sets out relevant institutional arrangements and procedures for the authorisation, tracking, and transfer of internationally transferred mitigation outcomes (ITMOs), the application of corresponding adjustments, and reporting in accordance with the relevant guidance under Article 6.2 of the Paris Agreement. Transfers under the ICCG are formally authorised by DCCE, which serves as the designated authorising authority for ITMO transfers.

In August 2025, Thailand was the first ASEAN country to sign an Implementation Agreement with Singapore [39]. The two governments published eligible crediting programmes and methodologies on 18 November 2025. [40] A call for project applications opened on 2 April 2026. [41, 42] In November 2025, Thailand and Japan completed the first international transfer of Joint Crediting Mechanism (JCM) credits as ITMOs, totalling 1,009 tCO_2eq from a 5 MW floating solar project. [48] Separately, by September 2026, Thailand's Bangkok E-Bus Program had generated a cumulative 108,960 ITMOs for transfer to Switzerland under the two countries' Article 6.2 agreement. [47]

Corresponding adjustments will be reported in its Biennial Transparency Report. TGO's national registry, in operation since 2016, is the sole authorised ledger for Premium T-VER and JCM credits. [43] This sovereign registry is a key advantage, as compliance buyers increasingly favour credits issued and tracked by a national authority.

Regional cooperation

Thailand also participates in the industry-led ASEAN Common Carbon Framework (ACCF). Launched at the 29th United Nations Climate Change Conference, the ACCF covers market development, infrastructure such as interoperable registries and exchanges, and capacity building. The ACCF has been referenced by ASEAN economic ministers and in ASEAN's joint statement to the 30th United Nations Climate Change Conference. [44] Following a strategic memorandum of understanding signed in November 2025 between the Thailand Carbon Markets Club (CMC) and the Macao International Carbon Emission Exchange (MEX), the renewable energy subsidiary of Bangchak Group (BCPG) listed Thai renewable energy certificates and T-VER credits on the Macau platform in March 2026. [45] These initiatives give Thailand an opportunity to shape regional standards, but multiple bilateral and platform channels will need a common registry backbone to avoid double counting.

6. Challenges and gaps

Delayed and uncertain compliance framework

The draft Climate Change Act remains under legal review, and its mechanisms, timeline and key provisions could still change significantly before enactment. The implementation timeline is tight and may be revised as further technical studies on ETS design and the transition to a carbon tax are completed. Based on the current draft, an ETS readiness phase would begin around 2028, followed by a pilot around 2029. Core design elements remain unresolved, including sector coverage, cap setting, offset eligibility rules and whether credits can be used against carbon-tax liabilities. This uncertainty makes it difficult for businesses to plan investment and compliance strategies.

Weak price signal and limited compliance demand

Thailand's only operational carbon price is the carbon component embedded within the fuel excise tax, which has so far left retail prices unchanged and provides little incentive to reduce emissions. The proposed carbon tax would remain low relative to regional benchmarks. At the same time, the voluntary market is oversupplied: unused T-VER credits far exceed the volume that a 15 per cent offset limit could absorb, utilisation remains low and demand is driven mainly by voluntary corporate commitments. Premium T-VER, the scheme best placed for compliance and international use, is still at an early stage and will need further strengthening to meet international integrity standards. Without a meaningful domestic carbon price, Thai exporters' EU CBAM payments will flow abroad rather than funding decarbonisation at home.

Institutional, data and MRV readiness gaps

Mandatory compliance depends on reliable facility-level data, which has yet to be tested at scale. Reporting currently relies largely on voluntary corporate disclosures, and the planned framework covers only Scope 1 and Scope 2 emissions from stationary sources, leaving mobile combustion to the carbon tax. Although reporting is voluntary, companies who comply must report through multiple systems, which increases the administrative burden. Moreover, domestic verification capacity remains limited, and EU CBAM verification relies on EU-accredited bodies. The operational division of labour between institutions remains unsettled, and coordination between climate, fiscal, industrial and social policy remains at an early stage. A small domestic ETS could also face liquidity constraints without regional linkages.

Article 6 transfers not anchored to the NDC

Thailand has earmarked around 16.7 $MtCO_2e$ for Article 6 transfers up to 2030, but no allocation has been set for 2031 to 2035. It is also unclear whether unused volumes will roll over or whether the export share will shrink as domestic targets tighten. Because carbon projects take years to develop, limited visibility beyond 2030 could deter new investment. More broadly, without a framework that links authorisations to the NDC 3.0 pathway, low-cost abatement could be exported before it is needed domestically, leaving costlier options for meeting national targets.

7. Policy recommendations

These proposals build on announced reforms and identify additional measures to strengthen implementation and effectiveness.

Enacting the Climate Change Act and publishing a binding phased roadmap

Passage of the Climate Change Act is the key step toward producing a detailed, dated implementation roadmap covering mandatory reporting, the carbon tax, the ETS pilot, Thai CBAM and the Climate Fund. Mandatory reporting ideally should come first so that baselines are in place before obligations apply. The ETS could start with the power sector and a small number of energy-intensive industries, using an absolute, declining cap aligned with NDC 3.0. The 2027 to 2028 data-collection period should act as a formal review point for finalising coverage, caps and allocation. Free allocation should be benchmark-based and phased down towards auctioning on a published schedule, and draft subsidiary rules should be released early for consultation.

Strengthening the price signal and recycling revenues

The fuel excise levy could transition into a standalone carbon tax on a predictable upward trajectory so that it is visible to firms and can be recognised internationally, including under the EU CBAM. ETS offset eligibility should be confirmed early, limited to Premium T-VER or equivalent high-integrity credits and supported by continued TGO efforts to align Premium T-VER with Article 6.4 standards. Clear rules on whether credits may be used against carbon-tax liabilities, with safeguards against double counting, would help unlock domestic demand. Carbon revenues should be earmarked through the Climate Fund for targeted support to affected households and workers as well as clean-energy investment.

Building MRV capacity and operational mandates

Subsidiary legislation should clearly set out institutional mandates for policy-setting, allocation, registry operation, credit issuance, verifier accreditation and Article 6 authorisation. To reduce the reporting burden, Thailand could use a single integrated reporting platform for both regulatory and disclosure requirements. The country will also need to expand verifier capacity ahead of the data-collection period and seek EU recognition of its verifiers under CBAM. Designing the allowance registry to integrate with the existing credit registry will avoid duplication and ease interoperability with ASEAN systems. As data centre demand grows, coverage of mobile combustion should be reviewed as well.

Establishing an NDC-aligned Article 6 authorisation framework

A framework will be necessary for deciding fairly which mitigation outcomes can be authorised for international transfer. At its core should be a published, quantified mitigation budget for the period to 2030 and for 2031 to 2035. The budget will distinguish the reductions needed

to deliver NDC 3.0 from those available for international transfer. The framework should clarify how any portion of the transferable volume that is not authorised or transferred within a period is treated and provide a pathway for post-2030 authorisations. It should prioritise the transfer of higher-cost or technology-intensive outcomes while reserving low-cost abatement for domestic compliance. Authorisation criteria should also reflect the requirements of key demand segments, including Article 6.2 buyers, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and corporate supply-chain buyers.

8. Outlook

Thailand has more carbon-market infrastructure in place than most of its ASEAN peers, including a live carbon price on fuels, a decade of T-VER experience, a sovereign registry and an operational Article 6 track. The challenge now is converting this foundation into a compliance system with a meaningful price. The enactment of the Climate Change Act, the content of the Act's subsidiary regulations and the alignment of the Power Development Plan 2026 (PDP2026) with NDC 3.0 will determine whether Thailand's carbon market drives real abatement or remains a largely voluntary, export-oriented credit market. Further delays risk compressing preparation timelines and locking in gas-fired capacity that will be costlier to unwind later.

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VIET NAM

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1. Key messages

Viet Nam has built the legal and institutional framework for a compliance carbon market at an impressive speed, especially for the region. However, a quickly built framework does not by itself produce a functioning market, and the carbon price the system currently generates is still too low to influence the energy transition.

The allowance cap now has to become effective. Viet Nam has created an allowance system, a national registry, a measurement framework and a functioning exchange in the space of four years. Trading has nevertheless been minimal since the exchange opened because allowances were allocated close to each facility's existing emissions. The allocation round for 2027 and 2028, for which ministries responsible for various sectors must submit proposals by 30 June 2027, is the first real opportunity to tighten the cap and to begin the shift from grandfathering towards product benchmarks.

The legal status of carbon allowances and credits is the single largest obstacle to private investment. Units can be held in custody and transferred, but their ownership, the rights attached to them and the obligations they carry are not defined. Until this is settled, the registry cannot function as a legal record of title, banks cannot lend against carbon revenue, and oversight remains divided between the environmental and the financial-market regulators.

Carbon pricing and green finance are advancing on separate tracks. The green taxonomy is in force and identifies eligible projects, but the green bond market remains small relative to stated investment needs and the pilot issuance of green government bonds has not begun. The decision on how auction revenue will be used should be made before auctioning starts in 2029.

Article 6 participation needs rules that protect the national contribution. Viet Nam has opened three transfer routes and reached agreements with Singapore and Japan, but no list of eligible methodologies has been published, and no transfer has been completed. A mitigation budget that separates what is needed to meet the nationally determined contribution from what may be authorised for export, together with published authorisation procedures, would give investors clarity and protect the target.

2. Context and baseline

Carbon emission profile

Coal dominates power generation in Viet Nam, although its share of installed capacity is considerably smaller. In the first half of 2026, total generation and imports reached 171.54 billion kilowatt-hours (kWh), 9.9 per cent higher than the same period in 2025; peak demand reached a record 57,537 megawatts (MW) on 24 June 2026. [1] Within that half-year, coal-fired thermal supplied 54.5 per cent of the electricity, hydropower 21.0 per cent, other renewable sources 12.9 per cent, gas turbines 8.0 per cent and imports 3.5 per cent. Installed capacity is distributed differently. At the end of 2024 it stood at 82,387 MW, of which coal accounted for 32.5 per cent (26,757 MW), hydropower for 28.7 per cent (23,664 MW), wind, solar and biomass for 26.0 per cent (21,447 MW), and gas, oil and imported capacity for the remaining 12.8 per cent. In the same year, wind, solar and biomass nevertheless supplied only 12.8 per cent of total generation. [2] The gap between 26.0 per cent of capacity and 12.8 per cent of generation may reflect dispatch, grid and contracting constraints rather than a shortage of installed plants. It also explains why a low carbon price changes very little downstream, since the plants that set the system's emissions are dispatched on grid and contractual grounds rather than on the cost of carbon. [3]

National climate policy

The updated nationally determined contribution (NDC) submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in November 2022 commits Viet Nam to an unconditional reduction of 15.8 per cent against business as usual by 2030, equivalent to 146.3 million tonnes of carbon dioxide equivalent (CO_2e). In addition, there is a commitment to a conditional reduction of 43.5 per cent, equivalent to 403.7 million tonnes of CO_2e. Both commitments are measured against projected 2030 emissions of 927.9 million tonnes of CO_2e. [4] Decision 896/QD-TTg of 26 July 2022, approving the National Climate Change Strategy to 2050, sets a net-zero emissions **target** for 2050 with a national emissions peak in 2035. [5] This peak-date matters for what follows: Viet Nam is building a compliance market during a decade in which its own strategy expects absolute emissions to keep rising.

"Viet Nam has created an allowance system, a national registry, a measurement framework and a functioning exchange in the space of four years."

3. State of the emissions trading system and the carbon market

Legal framework and pilot emissions trading system design

The pilot emissions trading system (ETS) with quantified allowances for specified sectors is operational. Decision 263/QD-TTg of 9 February 2026 approved a total pilot allowance budget of around 511 million tonnes of CO_2 equivalent for 2025 and 2026, covering 34 thermal power plants, 25 iron and steel facilities and 51 cement facilities. [6] Decision 699/QD-BNNMT of 27 February 2026 then distributed that budget facility by facility, free of charge. [7] According to the Department of Climate Change (DCC), the three sectors covered account for 48.4 per cent of national greenhouse-gas (GHG) emissions. [8] The domestic carbon trade exchange opened at the Hanoi Stock Exchange (HNX) on 29 June 2026, and the first allowance transactions cleared at an opening transaction price of VND 136,000 per tonne, roughly $5. [9]

Prime Minister's Decision 232/QD-TTg of 24 January 2025 approved the Scheme for the Establishment and Development of the Carbon Market, and it remains the founding instrument for the carbon market in Viet Nam. The Decision fixes the timetable, the scope of participation and the trading venue upon which every later regulation will build. It outlines three stages.

The first stage ended in June 2025, and covered completion of the legal and infrastructure framework. The second runs from 2025 to 2028 and is the nationwide pilot: all allowances are allocated free of charge, participation is limited to facilities receiving allocations and other qualifying organisations, and carbon credits may be used to offset obligations under the ETS. The third stage begins in 2029, and the system moves to official operation with expanded coverage and a combination of free allocation and auctioning.

The Decision designates the HNX as the carbon trading exchange (CTX) platform with responsibility for delivery-versus-payment settlement given to the Viet Nam Securities Depository and Clearing Corporation (VSDC). [10]

Decree 119/2025/ND-CP, which was signed on 9 June 2025 and effective from 1 August 2025, regulates the design of the ETS, including GHG inventory, allocation, compliance flexibility mechanisms and monitoring, reporting, and verification (MRV). [11] It provides allowances for thermal power, iron and steel and cement production facilities, and it designates three allocation phases from 2025 to 2026, from 2027 to 2028 and from 2029 to 2030. The Decree also requires sector ministries to propose facility lists and annual allowances by 30 June 2027 and 30 June 2029 respectively. Additionally, the Ministry of Agriculture and Environment (MAE) must consolidate them for the Prime Minister by 31 October in each period. In the Decree, the formula and approach for allocation is a hybrid of benchmark (performance approach) and grandfathering (historical approach), adjusted by coefficients including the sectoral growth targets and emission reduction rate. [11] The grandfathering for each facility is based on its own historical activity inventory data for 2022 to 2024 [12]. Because the allowance derives from each facility's own recent emissions, the cap sits close to what those facilities already emit. This creates the liquidity problem discussed in Section 6.

The Decree's flexibility provisions cap the use of carbon credits to offset the compliance obligation at 30 per cent in each allocation period. It also allows a facility to bank the unused allowances to the next phases without limitation and to borrow forward 15 per cent of its next-period allocation, which is not traded, until 2030 [11]. Eligible offsets must come from mechanisms under Articles 6.2 and 6.4 of the Paris Agreement and methodologies developed or endorsed by line ministries in charge of the sectors. Furthermore, eligible offset credits must represent reductions achieved from 1 January 2021 onwards. [11] The 30 per cent ceiling of offset credits is higher than the prevailing rate in other ETSs. For example, the ceiling is only 5 per cent in the Republic of Korea's ETS. Earlier modelling for the DCC tested ceilings of 10 and 20 per cent in general, and under the unconditional contribution scenario, modelling favoured the 20 per cent variant. [13] The government nevertheless adopted a 30 per cent ceiling, which is more permissive than either option the modellers examined.

Government's Decree 29/2026/ND-CP, issued and effective on 19 January 2026, regulates the CTX operation, including participants, registration, custody, trading and settlement. The Decree sets the pilot to run until 31 December 2028 and exchange fees to be charged only from 1 January 2029. [14] The price signal generated by the system is modest: the same modelling describes equilibrium starting prices of $1.1 to 3.7 per tonne of CO_2e across six ETS scenarios. [15]

MRV and registry infrastructure

The MRV framework is legally complete, but infrastructure, such as the Online Facility-Level Greenhouse Gas Management System in Viet Nam, is still under development. Most recently, Decision 42/2026/QD-TTg of 10 August 2026, effective 25 September 2026, lists 2,441 facilities that are obliged to conduct and report on GHG inventories, 275 more than the list it replaces. [16] The inventory and reporting obligations now apply to all 2,441 facilities, but only 110 of them hold allowances under the pilot ETS. From 2027, the covered facilities must also annually report their mitigation measures to provincial authorities.

The verification of GHG inventories for compliance entities will change during each of the three designated allocation phases. In the 2025 to 2026 pilot period, allocation relied on self-reported facility data. However, during the phase from 2027 to 2028, third-party verification will be required. This is expected to improve data quality and integrity, involving three levels of verification. First, facilities report to provincial authorities by 31 March each year. Second, sector ministries verify at sectoral level. Lastly, a national appraisal council of at least nine members must issue conclusions within ten days. Independent verifiers must hold conformity-assessment registration certificates. [17]

Capacity and readiness at the facility level is crucial to ensure the data quality. The evidence on facility readiness is mixed at best. A survey conducted in November 2023 obtained valid responses from 237 out of 537 companies emitting more than 10,000 tonnes of CO2e. The survey results showed a limited readiness, particularly in MRV capacity, with foreign-invested companies noticeably better prepared than domestic enterprises. [18] Later in 2026, a DCC survey covering 91 installations under the ETS showed that only 12 had established MRV systems that were operating stably, while the remaining installations were still at the early deployment or preparation stage [19].

Circular 11/2026/TT-BNNMT, issued by MAE on 13 February 2026 with effect from 30 March 2026, governs the National Registry System for Greenhouse Gas Emission Allowances and Carbon Credits. Each organisation with an allocation holds one account linked to its tax identification number, with sub-accounts tracking units through registry, trading, transfer, borrowing, offset, repayment and lock-down states. The Ministry assigns domestic codes, and the Circular provides for coordinated data exchange with the stock exchanges and the central depository. [20]

Market governance

Day-to-day governance of the ETS is divided among four ministries. First, the MAE is responsible for carbon-market management. It proposes allowance budgets, issues facility allocations, manages the National Registry System, conducts national verification and authorises international transfers. Second, the Ministry of Finance oversees the financial-market side and directs the State Securities Commission, the exchanges and the depository. The Commission supervises trading conduct, but the scope of its mandate awaits clarification of the legal status of allowances and carbon credits. The final two ministries are the Ministry of Industry and Trade and the Ministry of Construction. They propose facility lists and quotas for energy and for construction materials, and they also verify at sectoral level. Two other bodies take part without being carbon-market regulators. Provincial People's Committees receive facility mitigation reports each year from 2027, and the Prime Minister approves the scheme and the allowance budget for each period.

4. Industrial decarbonisation and energy transition linkages

Prime Minister's Decision 768/QD-TTg of 15 April 2025 approved the revision of the eighth National Power Development Plan, targeting renewable sources, excluding hydropower, at 28 to 36 per cent of capacity by 2030 and 74 to 75 per cent by 2050. By 2050, the plan envisages ending the use of coal for power generation, with 25,798 MW of thermal power capacity converted to run entirely on biomass or ammonia. [21] The plan nonetheless retains 31,055 MW of coal in 2030, above the 26,757 MW installed at the end of 2024. Consequently, the coal fleet is scheduled to grow before it shrinks. The ETS covers precisely those coal-fired plants.

Currently, the carbon price provides an introductory signal rather than a decisive driver of power dispatch. Decision 2626/QD-BTNMT of 10 October 2022 sets the emission factor for anthracite, the predominant coal type in Viet Nam's thermal fleet, at 98,300 kg of CO_2 per terajoule of fuel input. [22] At net thermal efficiencies of 33 to 40 per cent, that corresponds to roughly 0.9 to 1.1 tonnes of CO_2 per MWh generated. At the VND 136,000 per tonne cleared on the opening day of the exchange, the allowance cost of a megawatt-hour of coal-fired generation is therefore about VND 120,400 to 149,600. That is a small fraction of the fuel, capital and contractual factors that determine dispatch order and long-term capacity investment.

The two other covered sectors, cement and steel, show the same pattern at different magnitudes. A study of 71 kiln lines at 48 plants, covering about 91 per cent of national output, puts Viet Nam's cement emission intensity at 897 kg of CO_2e per tonne of clinker and 718 kg per tonne of cement. [23] For steel, a Ministry of Industry and Trade survey of selected producers puts intensity at roughly 2.1 tonnes of CO_2 per tonne of steel produced. [24] At VND 136,000 per tonne of CO_2, these intensities correspond to an allowance value of about VND 97,600 per tonne of cement and VND 285,600 per tonne of steel. Because allocation is free and set close to actual emissions, neither is an out-of-pocket cost today. It becomes one only if a facility emits more than its allocation, and after auctioning begins in 2029. Plant-level intensity also varies within each sector, which is the practical argument for moving from grandfathered allocation to product benchmarks: under grandfathering the higher-emitting plant receives the larger allocation.

In addition, passing allowance costs directly to end consumers involves policy trade-offs, as retail electricity tariffs are state-regulated rather than market-driven. If allowance costs are excluded from the retail tariff, power generators absorb these expenses directly within their operational margins. Conversely, incorporating these costs into the tariff would increase electricity rates for households and businesses. Policy decisions must therefore weigh the balance between the carbon pricing signal and consumer price stability.

In the near term, contractual and regulatory reform rather than the carbon price is the practical driver of corporate renewable power purchasing. Decree No. 243/2026/ND-CP of 26 June 2026, which amends Decree No. 57/2025/ND-CP on direct power purchase agreements and renewable energy, allows large electricity users to purchase renewable power directly from generators rather than relying solely on the national utility. Furthermore, owners of eligible self-consumption rooftop solar systems may sell surplus electricity to the relevant electricity buyer. The quantity purchased is generally capped at 50 per cent of the system's calculated electricity output (increased from the previous 20 per cent cap) at the previous year's average electricity-market price. This is subject to the applicable ceiling for ground-mounted solar power. In short, what moves industrial and corporate decarbonisation in Viet Nam today is contractual and regulatory reform, not the carbon price. The carbon price will start to shape investment only when the cap tightens and auctioning begins in 2029.

5. Regional cooperation, CBAM exposure and Article 6

CBAM exposure and response

The EU carbon border adjustment mechanism (CBAM) came into effect on 1 January 2026, covering cement, iron and steel, aluminium, fertilisers, electricity and hydrogen. [25] According to a 2023 assessment of CBAM impacts, iron and steel and aluminium account for almost all of Viet Nam's exposure, as cement and fertiliser exports to the European Union are marginal. [26] Free allocation does not constitute a carbon price paid: the deduction available to an importer reflects the carbon price effectively paid in the country of origin, net of free allocation, so no deduction can be claimed for allowances received free of charge.

Article 6 and credit readiness

Decree 112/2026/ND-CP, effective from 19 May 2026, opens three routes for the international transfer of mitigation outcomes (MOs) and carbon credits: (a) mechanisms under Article 6.2 of the Paris Agreement, (b) mechanisms under Article 6.4 and (c) independent third-party standards. It distinguishes government-authorised transfers, for which Viet Nam applies a corresponding adjustment, from unauthorised transfers, whose emission reductions continue to count toward the national contribution [27].

On credit readiness, no domestic crediting methodology has yet been issued under any of the three routes. Twenty-three Clean Development Mechanism (CDM) projects are qualified for transition to Article 6.4, and they are at present, the only identified pipeline of domestic credits that could be used for offsetting under the pilot ETS.

Regional cooperation and international linkage

Viet Nam has reached several agreements with regional partners. The Implementation Agreement with Singapore under Article 6.2 was signed on 16 September 2025 and approved by Resolution 235/NQ-CP. It has not, however, as of 30 September 2026, entered into force, and neither the list of eligible methodologies nor any completed transaction has been published. [28] Once it enters into force, the agreement will allow authorised mitigation outcomes to be transferred to Singapore with a corresponding adjustment applied by Viet Nam, and the eligible methodologies are expected to be published at that point. On 2 May 2026, Viet Nam and Japan signed a new Memorandum of Cooperation on Low-Carbon Growth, establishing the Joint Crediting Mechanism (JCM) as a cooperative approach under Article 6.2. [29] Bilateral negotiations with Republic of Korea and Switzerland are also currently ongoing.

Linking the domestic ETS internationally is not expected during the pilot phase, but it will be considered for the full operational phase starting in 2029. At this stage, the most critical priority is connecting the National Registry System with international registries to enable the cross-border transfer of MOs.

"In short, what moves industrial and corporate decarbonisation in Viet Nam today is contractual and regulatory reform, not the carbon price."

6. Challenges and gaps

Thin trading and weak demand

As of 30 September 2026, transactions on the CTX have been low. The concern is not the level of the carbon price but the low liquidity. Four structural causes account for this. First, the participant pool is very small: there are only 110 facilities in three sectors, belonging to 92 enterprises. Those enterprises have broadly similar cost structures and, in thermal power in particular, substantial common state ownership, so parties holding correlated positions have little reason to trade with one another. Second, the allocation method described in section 3 may carry a high risk of over-allocation, so few facilities face a shortfall that would oblige them to buy. Third, the flexibility provisions are generous: banking, borrowing and offsetting all allow a facility to defer demand rather than meet it now. Finally, the penalties applied to non-compliance are comparatively weak.

The way trades are arranged reinforces these effects and limits market visibility. Moreover, bilateral negotiated transactions require a good working knowledge of the carbon market, which is still generally low in Viet Nam. Negotiated transactions also reduce the opportunity for participants to see a clear price index or a public list of offers.

Nevertheless, even if the cap tightens, demand will flow first to the cheapest source. Because domestic crediting methodologies are not yet established, the near-term result is more likely to be borrowing than purchasing offset credit. [30] The allocation round for 2027 and 2028, for which sector ministries must submit proposals by 30 June 2027, is the first substantive test of the cap.

Unsettled legal status of carbon assets

Although Decree 29/2026/ND-CP allows allowances and eligible offset credits to be held in custody and transferred, the lack of a clear legal determination regarding their ownership, rights, and obligations remains a primary regulatory barrier. Without settling their legal nature, facilitating transactions under the pilot ETS and attracting private capital to decarbonisation projects will remain difficult.

A classification decision is therefore needed, and the recommended operational model prepared for the Ministry of Finance examines the options in detail. [31] Whichever classification is adopted, settling it would provide legal certainty across civil, commercial, accounting and tax frameworks, and would resolve two core operational and financial bottlenecks:

(a) **Operational and registry governance:** An unsettled classification prevents the registry from functioning as a true legal record of title. It also perpetuates an administrative split between environmental and financial-market regulators over jurisdictional oversight.

(b) **Financing and asset valuation:** The legal classification of carbon allowances remains unclear, creating uncertainty over their accounting and tax treatment and whether financial institutions can accept them as collateral. [31]

Without legally settled property rights, carbon revenues remain mere operating cash flows rather than bankable assets, forcing industrial decarbonisation projects to compete for limited balance-sheet capital, green loans, and concessional finance.

Green finance is not yet connected to the carbon market

Viet Nam's broader green-finance framework has advanced further than the carbon market it is meant to complement. Decision 21/2025/QD-TTg, effective from 22 August 2025, established the environmental criteria for green taxonomy. It covers 45 project types across seven sectors and makes confirmed projects eligible for green credit and green bond financing. [32] Nevertheless, the green bond market remains small relative to stated investment needs, and the pilot issuance of green government bonds envisaged from 2026 has not started yet.

"Viet Nam's broader green-finance framework has advanced further than the carbon market it is meant to complement."

7. Policy recommendations

Tighten the allocation and begin the shift to benchmarks in the 2027 to 2028 period

The main problem in the pilot is not the price level but the low liquidity. The cause is an allowance allocation that sits close to what covered facilities already emit. The timeline is as follows: sector ministries must propose facility lists and annual quotas for 2027 and 2028 by 30 June 2027, and the MAE must consolidate them for the Prime Minister by 31 October of the same year. [11] Three steps could be taken at that point. Publishing a declining cap trajectory for the periods 2027 to 2028 and from 2029 to 2030 would allow facilities to plan abatement rather than wait. Secondly, initiating the move from grandfathered allocation to product benchmarks, which Decree 119/2025/ND-CP already identifies as the preferred approach, would distinguish efficient from inefficient plants within each sector. [11] Finally, calibrating the flexibility provisions, in particular bringing the 30 per cent offset ceiling closer to the 20 per cent variant favoured by the (unconditional NDC scenario) modelling for the DCC, would help a tighter cap translate into demand rather than deferral. [13]

Settle the legal status of carbon allowances and credits

Allowances and credits can be held in custody and transferred under Decree 29/2026/ND-CP, but their legal nature is not defined. [14] The operational model study prepared for the Ministry of Finance is explicit on this point. It strongly recommends that the decree, or a subsequent guiding law, classify carbon allowances as a specific type of regulated financial asset, and it identifies the inability to use allowances as financial collateral as a direct consequence of leaving the question open. [31] The same study sets out two further steps that do not depend on how the classification question is answered. The first is a binding joint coordination regulation between the Ministry of Finance and the MAE, in place of the present dual-governance arrangement, with explicit language giving the State Securities Commission jurisdiction over market conduct surveillance. The second is a binding service-level agreement among the MAE, the HNX and the VSDC covering technical protocols, data exchange standards and minimum system uptime. [31] Until the legal nature of carbon units is settled, together with their accounting and tax treatment, industrial decarbonisation projects must compete for balance-sheet capital on ordinary terms.

Connect carbon pricing to green finance and decide how auction revenue will be used before 2029

The green taxonomy and the carbon market currently operate as separate systems. [32] Three steps to link these systems should be considered. First, recognising verified ETS performance in the confirmation process for taxonomy-eligible projects would let facilities that abate under the cap draw on green credit on better terms. Secondly, allowing carbon revenue, once its legal status is settled, to be counted in the cash-flow assessment of green loans and bonds would make abatement investment financeable. Finally, deciding before 2029 how auction revenue will be used, including whether a share is directed to industrial decarbonisation and to support for affected consumers, would avoid the position in which the auction begins without an agreed destination for its proceeds. The pilot issuance of green government bonds envisaged from 2026 would be a good place to test these links. Auctioning itself begins in the operational phase in 2029. [10]

Complete the rules for authorising international transfers

Decree 112/2026/ND-CP distinguishes authorised from unauthorised transfers and provides for corresponding adjustments, but it does not set out how those adjustments will be implemented or who is responsible for them. [27] The Article 6 study prepared for the MAE recommends supplementary guidance on corresponding adjustments. Specifically, it addresses trigger points, institutional responsibilities and documentation, and stronger arrangements for tracking and reporting adjustments through the National Registry System. [30] The same study notes that the positive list of activities does not specify which crediting methodologies are acceptable, and it recommends guidance on how activities are classified and on the transfer rates that apply to them. [30] On the quantity that may be transferred, it works from the present retention-based approach rather than from a fixed export budget: it proposes a review of transfer rates in 2027 against progress towards the unconditional component of the NDC, and recommends assessing options to complement retention, including a national buffer account. [30] Two additional procedural points matter to project developers. Authorisation decisions should carry detailed written reasons rather than generic refusals, and bilateral agreements under Article 6.2 should use standardised documentation and procedures. [30]

8. Outlook

Although Viet Nam has successfully established the foundational legal and institutional architecture for its compliance carbon market, there are still challenges that should be addressed to accelerate decarbonisation. These include overallocation, low liquidity, and unresolved property rights. As the pilot phase of Viet Nam's ETS unfolds through 2028, tightening the allowance cap, transitioning to third-party data verification, and clarifying the legal status of carbon assets will be critical to transitioning the administrative pilot into a functional compliance market. Resolving these operational bottlenecks is essential if the ETS is to effectively complement national energy transition goals, drive industrial investment, and position Viet Nam for international carbon market integration beyond 2029.

"…tightening the allowance cap, transitioning to third-party data verification, and clarifying the legal status of carbon assets will be critical to transitioning the administrative pilot into a functional compliance market."

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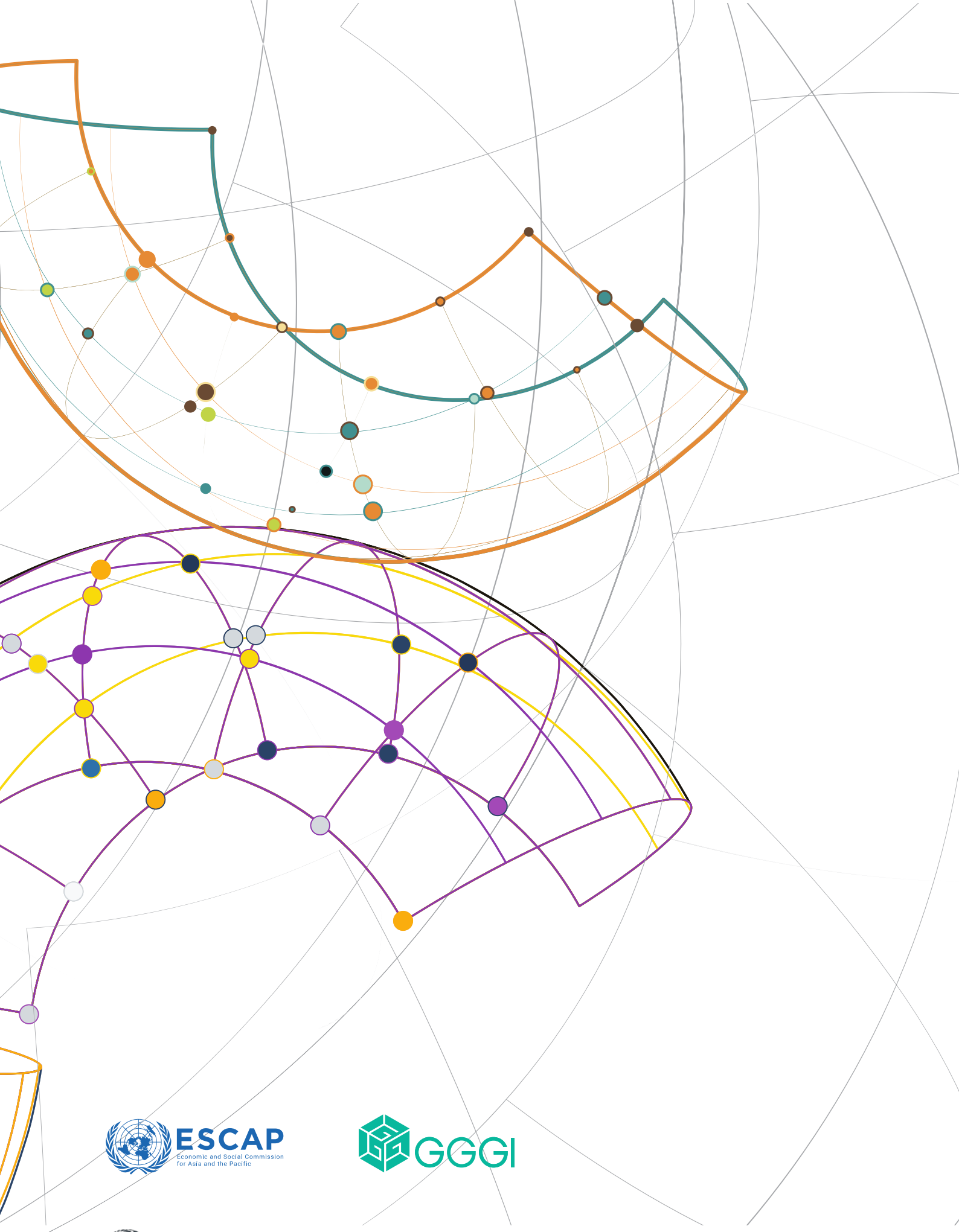
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