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ENERGY TRANSITION PARTNERSHIP

REPORT

ANALYSIS OF VIET NAM'S LEGAL FRAMEWORK AND INTERNATIONAL EXPERIENCES TO IDENTIFY GOVERNANCE OPTIONS FOR EMISSION TRADING SYSTEM IN VIET NAM

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DEVELOPMENT AND IMPACT ASSESSMENT OF CARBON CREDIT AND ALLOWANCE GOVERNANCE MECHANISM IN VIET NAM

REPORT

ANALYSIS OF VIET NAM'S LEGAL FRAMEWORK AND INTERNATIONAL EXPERIENCES TO IDENTIFY GOVERNANCE OPTIONS FOR EMISSION TRADING SYSTEM IN VIET NAM

A report analysing the legal framework in Viet Nam and international experiences to identify different governance options for the determination and development of the ETS governance options in Viet Nam, with a focus on the feasible options for the pilot operation during 2025-2027 period that reflects the most recent commitments under the NDC, net-zero and JETP

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COLOPHON AND DISCLAIMER

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EXECUTIVE SUMMARY

This report, "Analysis of Viet Nam's Legal Framework and International Experiences to Identify Governance Options for the Emission Trading System (ETS) in Viet Nam" was developed under the technical assistance project "Development and Impact Assessment of Carbon Credit and Allowance Governance Mechanism in Vietnam" funded by the Southeast Asia Energy Transition Partnership (ETP) to support the Department of Climate Change (DCC), Ministry of Agriculture and Environment (MAE). The study provides a comprehensive evaluation of Viet Nam's legal readiness, international best practices, and different governance design options for the pilot operation of the domestic Emission Trading System (ETS) in Viet Nam. The ultimate objective is to provide evidence-based recommendations that will allow Viet Nam to transition from conceptual planning to the operationalisation of a national carbon market aligned with its climate commitments, including its Nationally Determined Contribution (NDC), net-zero pledge for 2050, and the strategic objectives of the Just Energy Transition Partnership (JETP).

The legal foundation for ETS implementation in Viet Nam has been laid out through the Law on Environmental Protection 2020 (LEP 2020) and Decree No. 06/2022/ND-CP. Further momentum has been generated by the Prime Minister's Decision No. 232/QD-TTg on approval of the scheme for establishment and development of the carbon market in Viet Nam, which envisions a phased implementation from pilot to full-scale operation by 2028. However, substantial design and governance decisions remain, particularly concerning sectoral scope, cap-setting methodology, and allowance allocation mechanisms. The purpose of this report is to fill those gaps by combining legal analysis, international comparisons, and identification of options for modelling different governance scenarios.

International experience and key considerations for Viet Nam

The report outlined key design principles to guide the establishment of a robust ETS framework in Viet Nam, informed by international case studies selected based on three criteria: (i) system maturity (over five years of operation); (ii) contextual similarity (comparable economic, industrial, or regional conditions); and (iii) diversity in allocation mechanisms. Seven case studies were analysed: European Union (EU) ETS, South Korea ETS, China National ETS, Mexico ETS, Indonesia ETS, Canada's federal output-based pricing system (OBPS) and Alberta Technology Innovation and Emissions Reduction (TIER).

The review of international experiences highlighted several key insights. First, scope and coverage typically evolve over time, beginning with a limited number of sectors, such as power and heavy industry, and gradually expanding to include additional sectors like transport and buildings. Mature systems such as the EU ETS and K-ETS now cover a broad range of sectors and GHGs, while China's and Indonesia's systems remain focused on the power sector, reflecting an incremental approach suited to administrative capacity and data availability.

Second, cap-setting approaches vary between absolute and intensity-based methods. Most mature systems, such as the EU ETS, K-ETS, and Mexico ETS, use a top-down, absolute cap, offering greater environmental certainty. In contrast, China, Indonesia, and Canada's OBPS adopt intensity-based or bottom-up approaches, providing greater flexibility but requiring strong MRV systems to ensure environmental integrity.

Third, allowance allocation mechanisms differ widely, with a general shift from free allocation to increased auctioning in mature systems. The EU ETS and K-ETS use hybrid approaches, combining benchmark-based free allocation for emissions-intensive, trade-exposed (EITE) sectors with auctioning for others. Meanwhile, Mexico, Indonesia, and Alberta TIER rely predominantly on free allocation, often using historical emissions or intensity benchmarks. These practices reflect transitional considerations and political economy factors.

Furthermore, allowance prices vary significantly across systems, from under USD 1/tCO_2e in Indonesia to over USD 60/tCO_2e in the EU and Canada, indicating different levels of market maturity, policy ambition, and demand-supply dynamics.

Overall, these case studies demonstrate that the governance of ETS must be adaptable, balancing ambition with practical implementation constraints. Successful systems have achieved this by phasing in design elements, enhancing data infrastructure, and adjusting allocation rules in response to market performance and sectoral characteristics. These lessons offer valuable guidance for Viet Nam as it refines its ETS design, particularly in aligning cap-setting methods and allowance allocation with national priorities and capacity during the pilot phase.

Viet Nam's legal framework on ETS and Gap Analysis

This report also assessed Viet Nam's existing legal frameworks for ETS development, focusing on LEP 2020, Decree 06/2022/ND-CP and its proposed amendments, Decision No. 13/2024/QD-TTg and Decision No. 232/QD-Ttg.

Regarding scope and coverage, Viet Nam's current regulatory framework lacks clarity in certain areas. Although draft revised Decree No. 06/2022/ND-CP proposes including the thermal power, cement, and steel sectors in the pilot phase, the amendment has not yet been enacted, and the underlying rationale for sector selection has not been clearly articulated, leaving uncertainty for regulated entities.

Cap-setting presents a more fundamental gap. Viet Nam has yet to establish a regulatory or technical basis for determining emissions caps. The absence of clear guidelines risks regulatory uncertainty and the potential for overallocation, thereby weakening the ETS's environmental effectiveness.

Allowance allocation is similarly underdefined. While the draft amended Decree No. 06/2022/ND-CP suggests a fixed historical benchmarking approach for allocation, it does not incorporate key adjustment factors, such as emission reduction targets; business plans; abatement potential; or the technical and financial capacity of regulated facilities, limiting the robustness and fairness of the proposed approach.

Governance options and recommendations for ETS pilot operation in Viet Nam

To address the identified gaps in scope and coverage, cap-setting and allowance allocation, Deliverable 2 proposed a set of governance options and recommendations tailored to the ETS pilot phase. Informed by international best practices and the assessment of national context, these options serve to re-evaluate and operationalise key provisions outlined in the current draft amended ETS regulations.

First, in determining scope and coverage, three key aspects were considered: (i) sectoral coverage; (ii) emission sources; and (iii) the point of regulation. Sectoral coverage was assessed based on GHG emissions intensity and trade exposure, using classification from Decision No. 27/2018/QD-TTg. The results indicated that for the pilot phase, the thermal power sector, characterised by high emissions, low trade-exposure, was identified as a foundational sector for inclusion. The steel and cement sectors, having high emissions and high trade exposure, are also recommended due to their relevance in addressing carbon leakage risks, particularly in light of the emerging impacts of the Carbon Border Adjustment Mechanism (CBAM). In terms of emission sources, ETS should be limited to Scope 1 emissions, so as to ensure clarity in measurement, monitoring, and verification (MRV), and enhance the overall feasibility of system management. The point of regulation should be situated at major GHG-emitting activities, including crude steel production in the steel sector and clinker production in the cement sector, to support a targeted and effective approach to emission reduction while avoiding potential distortion of the emission intensity benchmark.

Second, options for the cap-setting approach were developed to align with Viet Nam's NDC, ensuring that the ETS complements national climate targets. Option 1: Based on the NDC's unconditional scenario with the national emission reduction target of 15.8%. Option 2: Based on the NDC's conditional scenario, with a more ambitious target of 45.3% compared to the Business-As-Usual (BAU) scenario in 2030. Option 3: Aligned with Viet Nam's commitment under the conditional NDC with JETP scenario, which envisions reducing the emission peak from 240 $MtCO_2e$ in the electricity sector by 2035 to 170 $MtCO_2e$ by 2030.

Third, for allowance allocation, the benchmarking methodology is proposed to promote efficiency, transparency and alignment with sectoral and industrial development plans. In addition, the use of carbon offsets is permitted but limited to 10% or 20% of total compliance. These limits will be assessed to determine the extent to which they can provide cost flexibility for regulated entities.

In summary, the recommended governance design for Viet Nam's pilot ETS includes the inclusion of thermal power, cement, and steel sectors, with a focus on Scope 1 emissions and allowance allocation is based on benchmarking to incentivise emission accuracy. In addition, the scenarios to be considered for cap-setting are the unconditional NDC, the conditional NDC, and the NDC combined with JETP support, with the restricted use of offsets up to 10% or 20% of total compliance obligations.

Deliverable 2 constructed policy-relevant scenarios that inform the subsequent economic and environmental impact modelling and analysis. A total of nine scenarios, combining variations in sectoral coverage, cap stringency, offset usage, and allowance allocation, were developed to serve as inputs for Deliverable 3 "Assessing and modelling the impacts of governance options for ETS in Viet Nam". This approach provides an integrated analytical foundation to support evidence-based decisions on the design and implementation of Viet Nam's pilot ETS.

ABBREVIATIONS

AFOLU	Agriculture, Forestry, and Land Use
AF	Adjustment factor
BAU	Business-As-Usual
BF-BOF	Blast furnace-basic oxygen furnace
CBAM	Carbon Border Adjustment Mechanism
COP26	26th Conference of Parties to the United Nations Framework Convention on Climate Change
DCC	Department of Climate Change
EAF	Electric arc furnace
EITE	Emission-Intensive Trade-Exposed
EPC	Emissions Performance Credits
ETP	Southeast Asia Energy Transition Partnership
ETS	Emissions Trading System
FSB	Facility-specific benchmark
GHG	Greenhouse gas
HPB	High-performance benchmark
IP	Industrial Processes
IPPU	Industrial process and product use
JETP	Just Energy Transition Partnership
LEP 2020	Law on Environmental Protection 2020
MARD	Ministry of Agriculture and Rural Development
MOC	Ministry of Construction
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MOT	Ministry of Transport
MRV	Measurement, Reporting, and Verification
NDC	Nationally Determined Contribution
OBPS	Canada's federal output-based pricing system
TI	Trade Intensity
TIER	Alberta Technology Innovation and Emissions Reduction
TMS	Target Management System
TOE	Tonnes of oil equivalent
VSIC	Viet Nam Standard Industrial Classification

I. BACKGROUND

I.1. Background

Establishing the Emissions Trading Scheme (ETS) is considered a vital tool in achieving cost-effective reductions in greenhouse gas (GHG) emissions – a trend increasingly adopted by countries worldwide. Recognising its significance, Viet Nam has laid a robust legal framework to foster the development and implementation of the ETS as a central policy instrument, aiming to attain national GHG emission reduction targets and achieve net-zero emissions by 2050. Accordingly, provisions for the organisation and development of ETS were introduced in the Law on Environmental Protection 2020 (LEP 2020) (The National Assembly, 2020). Under LEP 2020, Decree No. 06/2022/ND-CP, issued on 07 January 2022, by the Government on mitigation of GHG emissions and protection of the ozone layer (Decree No. 06/2022/ND-CP) details the organisation and development of ETS (The Government, 2022).

Most recently, on 24 January 2025, the Prime Minister approved the scheme for the establishment and development of the carbon market in Viet Nam, which defines the objectives for the development of the carbon market into three phases with four groups of tasks and solutions: (i) on the goods traded on the carbon market; (ii) on the subjects participating in the carbon market; (iii) on the national registry system and carbon trading exchange; and iv) on organisation for operation of the carbon market (The Prime Minister, 2025).

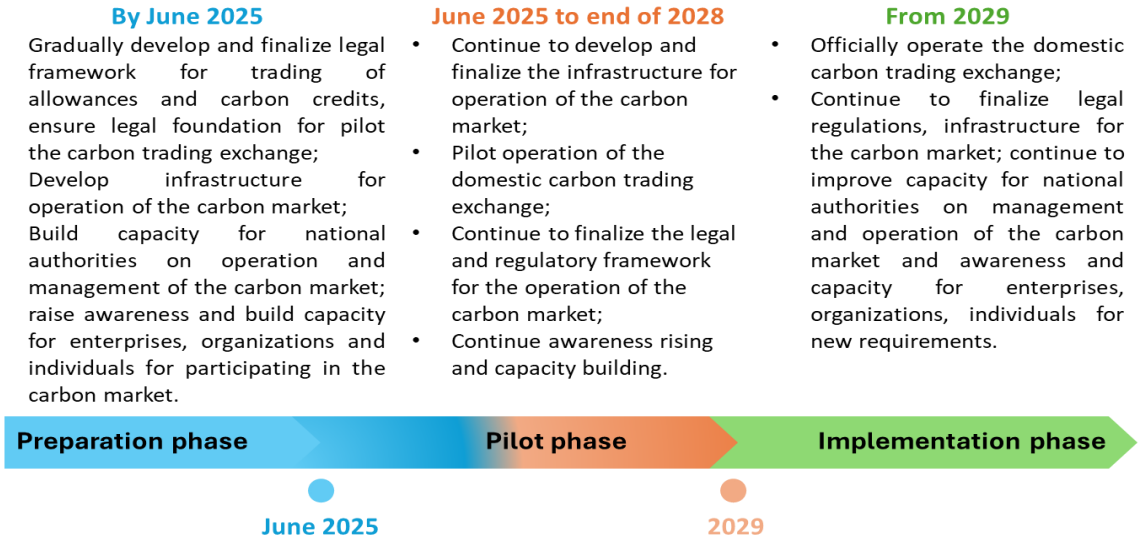

Figure 1: ETS roadmap in Viet Nam

Source: The Prime Minister, 2025

Despite significant efforts to establish the ETS, identifying governance options that align with Viet Nam's specific context while meeting NDC and net-zero commitments remains a complex challenge. Delays in phasing the ETS and achieving consensus on amendments to Decree No. 06/2022/ND-CP reflect this difficulty. With the ETS pilot planned for 2025, key uncertainties remain, including sector selection, cap-setting methods, and allowance allocation. These challenges highlight the critical need for further research to identify effective governance options for ETS in Viet Nam.

I.2. Scope of work, objectives and structure of the study

The Technical Assistance "Development and Impacts Assessment of Carbon Credit and Allowance Governance Mechanism in Viet Nam" has been launched under the Southeast Asia Energy Transition Partnership (ETP) to support the Department of Climate Change (DCC) within Ministry of Agriculture and Environment (MAE) in Viet Nam. Its primary objective is to conduct a comprehensive analysis and model the impacts of different governance mechanisms for carbon credits and GHG emission allowances. The evidence-based insights derived from this Technical Assistance will inform the development of a national legal framework to facilitate the effective operationalisation of Viet Nam's carbon market.

Under the Technical Assistance, this report aims to identify key design and governance options for establishing an ETS in Viet Nam, with a particular emphasis on those that are feasible for the pilot operation phase from 2025. To achieve this, the study adopts a comprehensive analytical approach, beginning with a synthesis of the key principles in ETS governance theories. This theoretical foundation is then complemented by an examination of international experiences with ETS implementation in various countries to draw lessons learnt and best practices that can be adopted for Viet Nam. Additionally, an in-depth analysis of the country's existing legal framework is conducted to identify gaps and governance challenges that may affect the ETS's effective implementation. Based on these analyses and evaluations, the study proposes practical, tailored governance options and recommendations for the successful implementation of Viet Nam's ETS in the pilot phase.

II. UNDERSTANDING ETS GOVERNANCE OPTIONS

The governance of an ETS is inherently linked to its design, as the effectiveness of the system's management is largely determined by its structural framework. In the case of Viet Nam, where the ETS is still in its early stage and many design elements remain unclear or under development, it is more practical to consider design and governance options in an integrated manner.

As of January 2024, 36 ETSs are operational worldwide, ranging from supranational to sub-national levels (ICAP, 2024a). These systems embody a diverse array of governance options, influenced by varying policy priorities, regulatory frameworks, and economic contexts. Each ETS is designed to reflect the unique circumstances of the regions or countries implementing it, offering valuable lessons and insights for the development of new systems.

To guide the design and implementation of an ETS, the World Bank proposes a 10-step process, ensuring that all key elements – ranging from legal frameworks to market operation rules – are effectively addressed. This structured approach provides a comprehensive blueprint for establishing a functional and efficient ETS, as illustrated in Figure below:

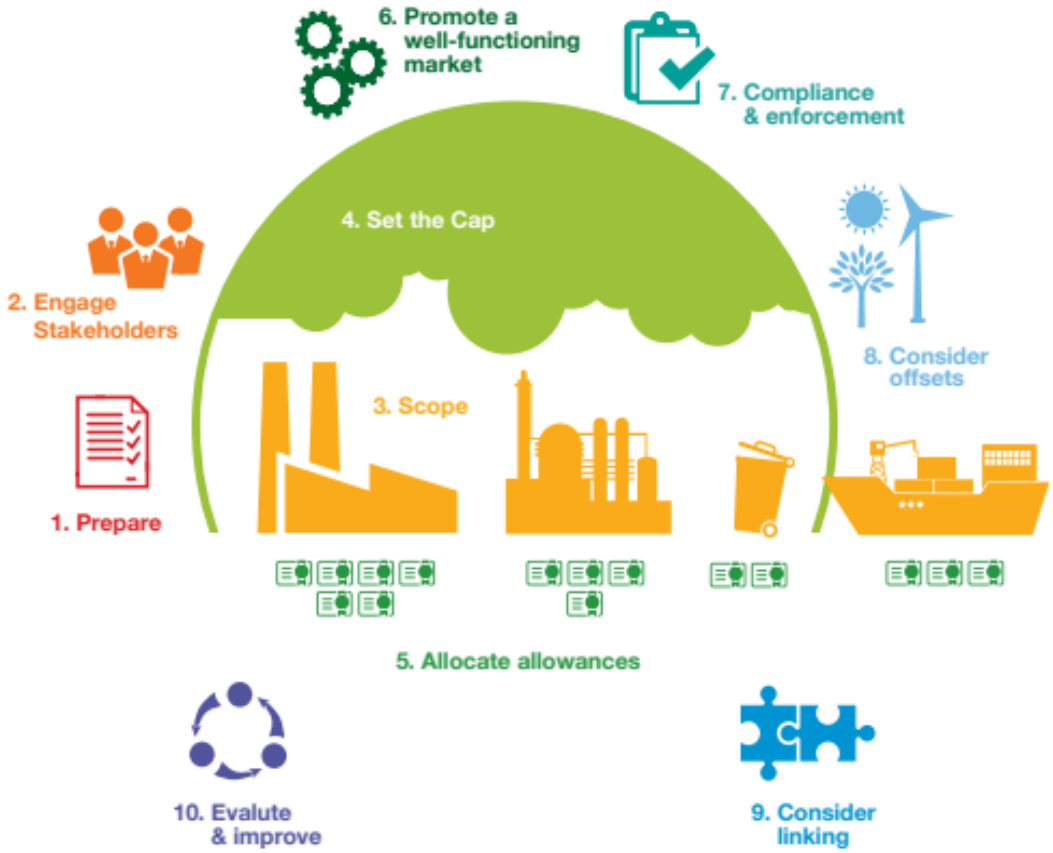

Figure 2: A 10-step process to design ETS

Source: World Bank, 2021

Among the ten steps in the ETS design framework, steps 3 to 5 – defining the scope, setting the cap, and allocating allowances – are particularly critical for creating a well-structured and effective system. These core steps determine the technical design and operational foundation of the ETS, including the coverage (sectors, gases, points of regulations, among others), the overall emissions

limit, and how allowances are distributed among participants. In contrast, steps 1-2 are preparatory, focused on groundwork and stakeholder engagement, while steps 6-10 support system functioning and enforcement once the core design is in place.

In Viet Nam's context, these core design elements have not yet been introduced in Decree No. 06/2022/ND-CP and have only been proposed conceptually in the draft amended Decree. Therefore, significant uncertainties persist regarding the feasibility of the proposed design, particularly in light of current data limitations and institutional capacities. Moreover, the extent to which different design options may influence market performance and compliance outcomes under various implementation scenarios remains unclear. Further clarification is thus necessary to ensure that Viet Nam's ETS is both coherent and functional.

To extract meaningful lessons for Viet Nam's ETS, particularly during the pilot phase, this section will focus on key design principles and the practical approaches adopted by other countries regarding scope and coverage, cap-setting, and allowance allocation. It begins with an overview of the fundamental concepts underlying these design features, alongside a discussion of various international approaches. In the subsequent section, a detailed comparative analysis of different ETS systems is provided, drawing on case studies from multiple regions and countries. This structure combines theoretical frameworks with empirical evidence, offering essential insights to guide the design and refinement of Viet Nam's ETS.

II.1. Scope & coverage

The scope and coverage of an ETS are foundational elements in its design, determining which sectors, industries, and gases are included within the system. Defining the scope & coverage is crucial because it directly influences the effectiveness of the ETS in achieving its emissions reduction goals and the level of impacts on participants and the macro-economy.

II.1.1. Sector and gas coverage

II.1.1.1. Sector coverage

When establishing the ETS cap, governments generally have two options in determining the sectors to be covered in the ETS: (i) prioritising sectors that contribute the most to the national emissions inventory and gradually extending the coverage to other sectors; and (ii) covering all sectors to ensure comprehensive coverage at the onset and gradually decreasing the emission caps.

Currently, most of the ETSs prefer to prioritise certain key sectors, such as the power and energy generation sector and large industrial manufacturing sectors, within their initial scope. By prioritising the highest emitting sectors, this approach would reduce the initial overall development and implementation costs of the ETS and achieve greater cost-effectiveness in reducing emissions (World Bank, 2021).

On the other hand, despite having a larger administrative and operational cost burden, a broader sectoral coverage also offers several advantages. First, a greater quantity and variety of regulated emitters, i.e. participants in the ETS, promote market liquidity. Market liquidity refers to the ability of markets to trade commodities (i.e. allowances) efficiently, i.e. quickly at any point in time at low transaction costs. The effect of a liquid market is stable market prices, whereas illiquid markets

are volatile with large fluctuations in prices. Next, more participants also generate more options for purchasing and selling allowances. Additionally, a broader sectoral coverage can prevent carbon leakage whereby emissions from a covered sector 'leak' to an uncovered sector as a result of a product substitution, particularly when the uncovered sector is not regulated through another policy instrument. Lastly, a broader sectoral coverage increases the scope of the carbon price signal and thereby captures a greater proportion of the potential benefits of using a market-based policy instrument (so as to minimise abatement costs).[1]

In conclusion, both options serve different purposes for the ETS system and need economic, administrative complexity, and data availability as considerations. Therefore, there is a great diversity across existing ETSs in terms of scope as illustrated in Figure below:

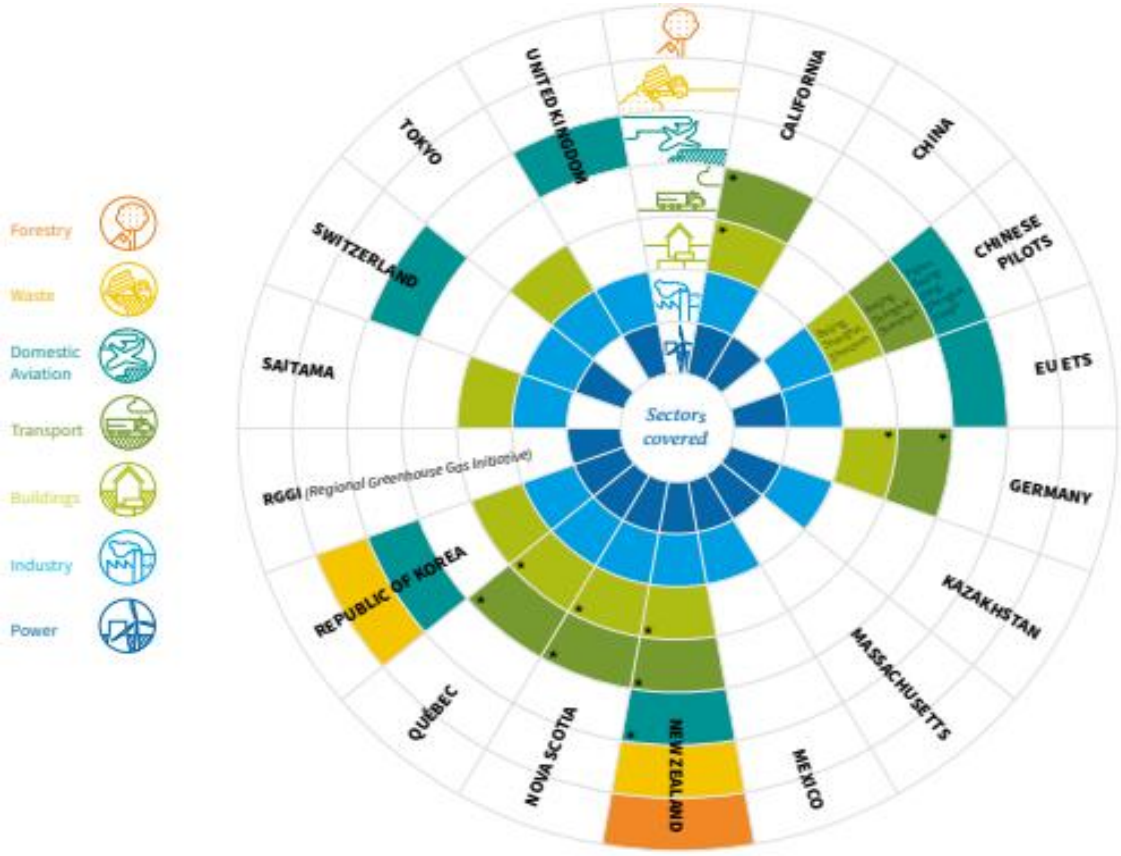

Figure 3: Sector coverage by existing ETSs

Source: World Bank, 2021

II.1.1.2. Gas coverage

GHGs comprise seven main types of gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). Ideally, covering all gases in an ETS is essential for global emissions mitigation as well as in terms of NDC implementation (assuming the NDC covers more than simply

[1]Notwithstanding, where there is a policy decision to exclude certain sectors from the ETS, one would need to assess if these sectors are regulated through another policy instrument such as energy efficiency standards, or whether there is no climate policy being planned for the sector.

CO_2). However, not all ETSs can cover all gases due to measurement and monitoring complexity and the added complexity of administration and enforcement. The complexity, in turn, leads to increased cost of implementation and enforcement.

Overall, the advantages of broader or narrower coverage are summarised in Table below.

Table 1: Assessment of different approaches to defining the GHG coverage in the ETS

	More Coverage	Fewer Coverage
Advantages	• Greater opportunity for low-cost reductions • Avoids the risk of leakage between sectors • Greater control over achieving a target.	• Lower administrative and transaction costs • Less risk of leakage between jurisdictions
Disadvantages	• Higher administrative costs • Requires management capacity to deal with the complexity	• Lower market liquidity • Less control over achieving the emission reduction target

Source: Consultant adjusted based on World Bank, 2021

Among the above mentioned GHGs, CO_2 is the most common one in existing ETSs since it is the main gas of fossil fuel combustion (99.9% on a molar basis), and fossil fuel combustion is the most common GHG-emitting activity in industrial and manufacturing facilities and premises.

Jurisdiction	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
California	●	●	●	●	●	●	●
China national and pilot*	●						
EU	●		●		●		
Kazakhstan	●						
Massachusetts	●						
Mexico Pilot	●						
New Zealand	●	●	●	●	●	●	
Nova Scotia	●	●	●	●	●	●	●
Québec	●	●	●	●	●	●	●
Republic of Korea	●	●	●	●	●	●	
Regional Greenhouse Gas Initiative (RGGI)	●						
Switzerland	●		●		●		
Tokyo-Saitama	●						

Figure 4: GHGs coverages in some existing ETS

On the other hand, certain non-CO_2 GHGs are unique to certain manufacturing and industrial processes that the ETS may prefer to cover, for example, the semiconductor and wafer manufacturing sector are major emitters of PFC, HFC and NF_3; while CH_4 is the main gas from fugitive emissions originating from the oil and gas extraction process, and from leaks and venting processes in the petrochemical and refining sector.

Hence, different ETSs choose different scopes in terms of gas coverage. They often include or start with CO_2 to initiate their ETS based on the ease of measuring and monitoring, with low uncertainty and at a reasonable cost. Furthermore, prioritising CO_2 is preferred as it accounts for 76% of total GHG emissions in the world (World Bank, 2021).

Nevertheless, over time, to increase the accuracy and confidence that the national emissions reduction objective could be achieved, it is generally advised that governments incorporate other

gases depending on the industry and government readiness (e.g., measurement standards, monitoring framework, etc). In conclusion, prioritising CO_2 is a necessary starting point and gradually covering all GHG emissions to achieve the overall objective of emission reduction (World Bank, 2021).

II.1.2. Reporting obligation

An ETS needs to identify and specify the legal nature of the GHG-emitting activity and the responsible entity that would have a legal obligation under the ETS. There are two options: (i) Installation: a specific entity with direct operational control over the installation with a well-defined physical boundary that produces the emission; and (ii) company: a specific entity with financial control over several installations under its corporate structure.

The choice typically depends on existing regulatory structures, e.g. legal and regulatory permits, land use allocation, enforcement against environmental pollution, collection of fuel data and excise duties, etc. An installation may have greater accuracy, but is harder to administer. On the other hand, a company can report aggregated data from multiple installations. Thus, having lower administrative costs and higher flexibility (World Bank, 2021). Hence, the choice is highly dependent on the infrastructure readiness and fiscal capacity to administer the monitoring process.

Table 2: Assessment of different approaches to define reporting obligation for the ETS

	Installation	Company
Advantages	• Preferably, where many companies are likely to be operating at the same installation. • Ownership transfers of installations between companies are easier to administer	• Lower administrative costs when reporting is required by aggregated units, such as at the company level. • More flexibility for the company as it does not have to report for each installation individually
Disadvantages	More administrative costs and a burden on national authorities to manage companies that have several installations	Less accuracy in the Monitoring-Reporting and Verification (MRV) approach

Source: Consultant adjusted based on (World Bank, 2021)

II.1.3. The point of regulation

The point of regulation refers to where in the supply chain of products (e.g. raw materials, intermediate feedstocks, end products) and energy commodities (e.g. electricity, heat, steam, chilled water) that the facilities producing or consuming these products and energy commodities are designated as the emitters to be covered in the ETS. Deciding the point of regulation means considering how upstream or downstream in the supply chain, and the point in the supply chain that is targeted by the ETS (ICAP, n.d.-c).

For example, in the transport sector, CO_2 emissions from the combustion of transportation fuels (e.g. diesel, petrol, CNG) are typically taxed upstream at the point of production, by way of CO_2 taxes or excise duties or covering fuel production facilities in the ETS, as it is administratively onerous to tax individual vehicles for the end-use fuel consumption.

The point of regulation is important to be clarified so that there should not be any cases of double taxation, i.e. same GHG emissions being covered by a carbon price twice under two different facilities in the same supply chain. This also means needing to define if direct (Scope 1) as well as indirect (Scope 2) emissions are to be covered in the ETS, based on the definition of the covered facilities.

For example, when there is combustion of fossil fuels for the purpose of electricity and heat generation by the thermal power plants (a sector covered by the ETS), these are the Scope 1 emissions of the thermal power plants. When manufacturing facilities purchase and utilise the electricity and heat (produced by the thermal power plants), these are the Scope 2 emissions of the manufacturing facilities. As the associated emissions from electricity and heat generation are already covered upstream in the ETS, through covering thermal power plants as an ETS sector, these Scope 2 emissions of the manufacturing facilities should not be covered under the ETS further. Moreover, in practice, as thermal power plants are paying the carbon price for the emissions associated with the energy and heat generation, these thermal power plants will pass on the costs of the carbon price (pass-through costs) to the end users of the electricity and heat, by including a 'carbon price' by unit of energy sold (e.g. $/mmBTU). Therefore, for many ETSs that cover upstream thermal power plants, only Scope 1 emissions are covered in the ETS and not also Scope 2 emissions. On the other hand, some ETSs focus on downstream users such as the Tokyo-Saitama ETS (focusing on commercial and industrial buildings), and these ETSs cover Scope 2 emissions through their consumption of fuels, heat, and electricity.

There are several advantages to regulating at the point where the emissions are produced i.e. Scope 1 emissions of "point sources": emitters will face the immediate and visible incentives to reduce emissions, more accurate emissions measurement given the direct nature of measurement and reporting, and better alignment with allowance allocations and other reporting requirements allowing for better administrative efficiencies (World Bank, 2021).

Furthermore, when defining the point of regulation in an ETS, the type of electricity market of the jurisdiction should also be considered. Typically, an ETS is designed to operate within a liberalised market where the electricity generation, distribution and supply are unbundled, creating competition amongst market players, power is dispatched based on their economic merit, and customers are free to choose their electricity supplier. In a liberalised market, the cost of emissions is internalised through the ETS, where low-carbon electricity becomes more competitive than fossil fuel electricity. As consumers switch to the cheaper low-carbon options, power plant generators become incentivised to invest in low-carbon technologies and ultimately drive decarbonisation in the sector (World Bank, 2021).

In contrast, regulations in the electricity sector may reduce the effectiveness of an ETS in driving decarbonisation as prices are not passed on to consumers, thus they are not incentivised to switch to low-carbon options. To address this barrier, including indirect emissions from electricity consumption within the scope of the ETS can help internalise the cost of emissions. This approach

has been adopted in China and South Korea, whose electricity markets are regulated. In these countries, large electricity consumers are required to surrender allowances for the indirect emissions from their electricity consumption (World Bank, 2021). Section III provides more details on the design of China and South Korea's ETSs.

II.1.4. Threshold

An ETS may be designed with thresholds to limit the number of regulated entities, thus reducing administrative and MRV costs for the system. The threshold can be defined using different indicators, e.g. GHG emissions, energy consumption, production level, or capacity. Entities below the threshold will not be subject to the ETS's requirements. Even though using the same indicator, different ETSs may adopt different levels of threshold dependent on their country's context. South Korea, for example, uses the annual GHG emission threshold of 25,000 tCO_2e and 125,000 tCO_2e at facility and company level respectively. The Mexican pilot ETS has that of 100,000 tCO_2e at facility level. The EU ETS, on the other hand, regulates power sector entities with a capacity of over 20 MW. The different thresholds across existing ETS are illustrated in Figure below:

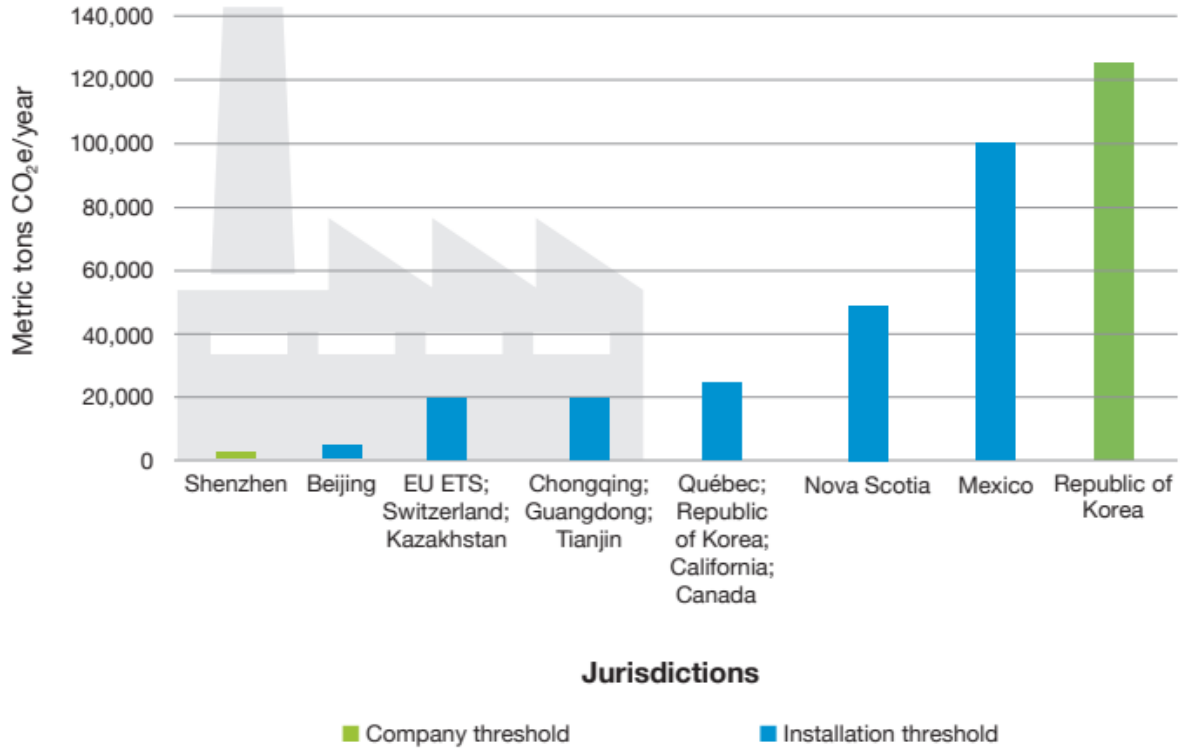

Figure 5: Variation in thresholds across selected jurisdictions (tCO_2e/year)

Source: World Bank, 2021

Countries may consider, while applying thresholds in the ETS, the possibility of entities breaking into smaller units in order to avoid compliance obligations.

II.2. Cap setting

Setting the cap is an important governance decision regarding the design of an ETS. It determines the total allowable emissions within the system and the significance of the system in contributing to a wider GHG mitigation target, e.g. the jurisdiction's climate goals and policy objectives.

II.2.1. Cap categorisation

Typically, a cap refers to the level or quantity of emissions that can be emitted and is also known as an absolute cap. A cap is also time-bound as it establishes a fixed amount of emissions emitted for a certain time. Therefore, the cap trajectory (over time) seeks to provide certainty over the expected environmental outcome (emissions certainty) at the onset. However, it may not be able to adequately take into account the prevailing economic considerations (e.g., competitiveness distortions, welfare) during the compliance period. Hence, it must be carefully calculated at the start to balance ambition and cost (World Bank, 2021).

Nonetheless, some ETSs also adopted intensity-based caps - the number of emission allowances based on a reference unit (GDP, kilowatt-hour of electricity, ton of raw material or product) that increases or decreases depending on the economic conditions. However, it does not provide emissions reduction certainty as it highly depends on other variables and ultimately may not reach the environmental objective because reductions in emissions intensity do not rule out increases in (absolute) emissions, due to growth in emissions-intensive production. Overall, the different types of caps are illustrated in Table below:

Table 3: Types of caps

Absolute cap	Intensity-based cap
• Carbon budget approach: Absolute limit on emissions over some fixed point in time • Normally expressed as a reduction compared to a base year • Constant absolute reduction sets a reduction way	• Targets set relative to the carbon intensity of an underlying metric (per GDP, capita, output) • Absolute emissions level not fixed – emissions increase under a growing economy • Could take a slow, stop, reverse growth approach

Source: World Bank, 2021

II.2.2. Approach to cap-setting

In cap-setting, governments mainly have two main approaches at the start: (i) the top-down approach, which is based on the NDC and strategic national mitigation goals; and (ii) the bottom-up approach. Both approaches serve differently and are selected based on economy-wide ambition and jurisdictional circumstances. In the top-down approach, the government sets the cap based on its overall emission reduction goals, using a high-level evaluation of economy-wide mitigation potential and costs across the covered sectors. On the other hand, the bottom-up approach determines the cap through a detailed assessment of emissions, mitigation potential, and costs for each sector, subsector, or participant.

Once the system evolved, a hybrid approach is typically used to increase accuracy by using bottom-up data and analysis to establish the cap, which is then adjusted to account for interactions between sectors and to align with the desired contributions of these sectors toward broader, top-down mitigation targets.

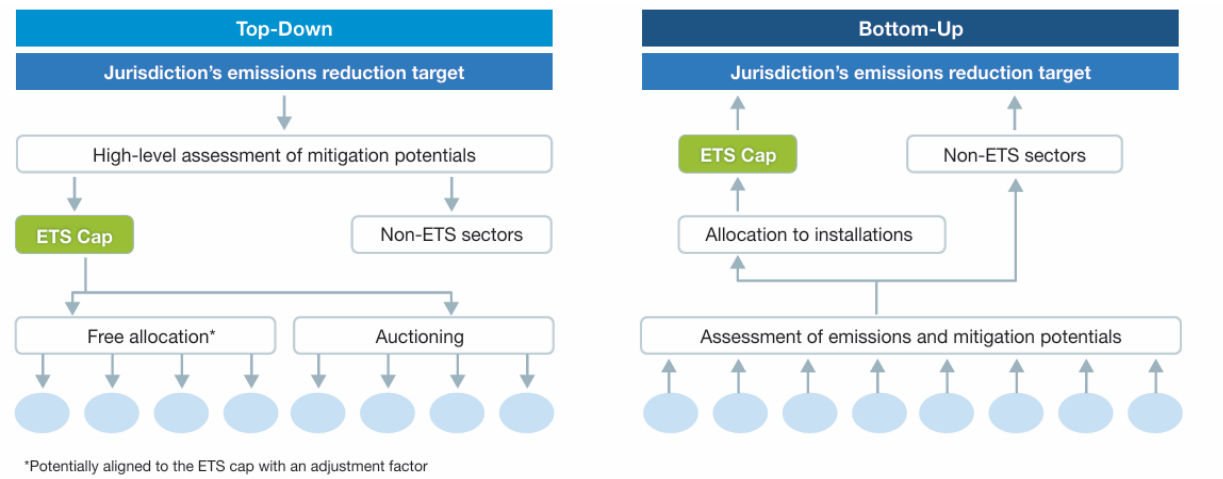

Figure 6: The approach for cap-setting

Source: World Bank, 2021

II.3. Allowance allocation

An allowance in an ETS refers to the right to emit one tCO_2e, which can then be traded in the market. The number of allowances in an ETS is capped to limit the pollution to a level that would otherwise occur. The method of allowance allocation in an ETS is crucial for achieving the ETS objectives. Broadly, there are two methods in allowance allocation: free allocation and auctioning, as presented in Table below.:

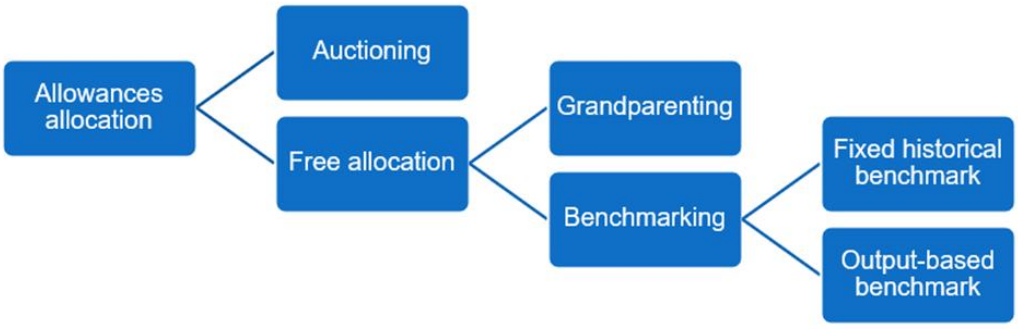

Figure 7: Methods for allowance allocation

Source: Compiled by the Consultant

II.3.1. Free allocation

Free allocation can reduce the negative impact on the competitiveness of regulated industries by offering support based on their historical emissions. It can foster greater acceptance during the early stages of an ETS and avoid carbon leakage. There are three methods implemented globally (World Bank, 2021).

- Grandparenting: This method allocates allowances for free based on a company's historical emissions.
- Fixed historical benchmarking: This method allocates free allowances using benchmarks that standardise the allocation per unit of historical output for a given product, such as per

ton of steel. It decouples the allocation from a facility's emissions intensity, meaning that the allocation remains the same regardless of changes in production levels or emissions intensity.

- Output-based benchmarked allocation (OBA): This method also uses product benchmarks, but the level of assistance adjusts based on the actual output during a compliance period, rather than a fixed historical output. Hence, the allocation would vary in every compliance period, unlike the fixed historical benchmarking approach.

Free allocation method is commonly adopted to safeguard the competitiveness of emission-intensive trade-exposed (EITE) industries. Specific criteria are set for a company to be considered as EITE and be eligible for free allocation. The criteria for EITE are normally set against production costs and trade intensity benchmarks and gradually change as the ETS evolves.

II.3.2. Auctioning

This approach involves allocating allowances to market participants through a supervised auction process. As allowances are not allocated for free, auctioning facilitates price discovery, creates monetary incentives for emission reductions and promotes market efficiency. Auctioning also generates revenue for the government, which can be used to support various initiatives. Regular auctions contribute to transparency and provide a consistent platform for price discovery and signalling (World Bank, 2021).

II.3.3. Hybrid allocation

In reality, many ETSs use a mix of free allocation and auctions. Under this method, certain industries, normally EITE industries, are given their allowances for free while others are required to participate in auctions. By adopting this approach, the government can minimise the risk of reduced trading liquidity in the secondary markets from having too much free allocation while also reducing the negative economic impacts on EITE industries to maintain their competitiveness.

III. REVIEW THE INTERNATIONAL EXPERIENCES TO IDENTIFY DIFFERENT GOVERNANCE OPTIONS FOR THE DEVELOPMENT OF THE ETS IN VIET NAM

III.1. Approach for selecting the ETSs for case study

As discussed above, there are different approaches to designing ETS governance aspects regarding scope & coverage, cap setting and allowance allocation. Therefore, ETSs in the world have been designed in different ways, taking into consideration their respective national context and local circumstances. Analysing their designs, including the reasons for adopting the chosen approaches and how they have affected the operationalisation of the ETSs, can provide meaningful insights for the design of Viet Nam's ETS.

To provide sufficient and relevant insights for Viet Nam both in terms of breadth and depth for the purposes of this Technical Assistance, the ETSs for the case study were selected based on the combination of the following considerations based on our experiences: (i) ETS maturity; (ii) similarity of the country with Viet Nam's local context; and (iii) variety in allocation mechanism.

The considerations are described and explained below in Sections III.1.1 to III.1.3, as well as the long list of ETSs and the final ETSs selected as case studies in Section III.2.

III.1.1. ETS maturity

ETSs that have undergone the full development processes (e.g., market establishment, development, and maturity) and have been operating for more than five years were selected for the case study as they reflect the models' capability to sustain in a long operating period. Thus, it can provide sufficient information on their piloting and operational phases in terms of challenges and lessons learnt, market establishment, market development, and market maturity phases. The information is expected to give valuable insight into its strategy in every phase.

III.1.2. Similar local context

This criterion was used to determine ETSs with similar characteristics to Viet Nam, which were determined by:

- Economic status

  Choosing ETSs developed by countries that have economic status similar to Viet Nam can give valuable information related to how a middle-income country develops its ETS amidst economic constraints.

- Energy and industrial mix

  Choosing ETSs developed by countries that have a similar dependency on high-emitting energy sources to Viet Nam can provide useful insights into how one country navigates the implementation of ETS amidst its high dependency on targeted sectors.

- Geographical similarities

Choosing ETSs developed by countries in the same region as Viet Nam provides unique perspectives on how Asian countries developed their ETS.

III.1.3. Variety in allocation mechanism and ETS type

To provide a comprehensive and in-depth analysis of different ETS design principles, additional ETSs with specific characteristics, e.g. ETSs with different allocation mechanisms and ETSs using different models such as baseline-and-crediting mechanisms, were included as part of the case studies. The variety in ETS design elements can give further valuable insights and lessons learnt for Viet Nam's ETS design.

III.2. Screening and selection of ETSs for the case studies

While not many ETSs can meet all three criteria mentioned above, the final set of case studies represents the most relevant examples, with each meeting at least two of the criteria in an outstanding manner. The chosen case studies offer a diverse perspective on ETS design and implementation, helping to identify best practices and potential challenges for Viet Nam. The following table provides the list of final seven case studies selected for further analysis, along with the rationale for the selection against the three criteria:

Table 4: The selected ETSs for case studies

ETS name	Rationale for selection		
	ETS maturity	Similar local context	Design variety
European Union ETS	The oldest ETS in the world, established in 2005 and is currently in its fourth phase. EU ETS has gone a full developmental cycle and thus included in the case study	The EU mainly consists of developed countries; therefore, this criterion is not applicable to EU ETS.	EU ETS is a cap-and-trade ETS system with an absolute cap setting
South Korea ETS	As one of the oldest ETSs in Asia, established in 2015 and currently in its third phase, the South Korea ETS has undergone a full developmental cycle and is thus included in the case study	South Korea's economy has a similar dependency on high-emitting resources like Viet Nam and located in Asia, and thus included in the case study	South Korea ETS is a cap-and-trade ETS system with an absolute cap setting and includes indirect emissions in its scope
China ETS	China began the China National ETS in 2021. Thus, this criterion is not applicable to China ETS	China's economy has a similar dependency on high-emitting resources like Viet Nam, which is located in Asia, and thus included in the case study	China ETS is a cap-and-trade ETS with an intensity-based cap setting and includes indirect emissions in its scope, providing a variation in ETS design for the case study
Mexico ETS	The first ETS in Latin America, Mexico began its ETS pilot in 2020. However, Mexico ETS has not entered its full implementation phase, thus this criterion is not applicable.	Similar to Viet Nam, Mexico is classified as a middle income country. Mexico's economy has a similar dependency on high-emitting resources like Viet Nam. Mexico ETS is included to give an example of an ETS in a developing country in Latin America and thus included in the case study	Mexico ETS is a cap-and-trade ETS system with an absolute cap setting

ETS name	Rationale for selection		
	ETS maturity	Similar local context	Design variety
Indonesia ETS	Although Indonesia ETS is relatively new (launched in 2023 following a 2-year pilot), it is still the only mandatory ETS currently in force in Southeast Asia and thus included in the case study	Indonesia's economy has a similar dependency on high-emitting resources like Viet Nam and located in Southeast Asia and thus included in the case study	Indonesia ETS is a cap-and -trade ETS system with an intensity-based cap setting, providing a design variety in the case study and thus included in the case study
Canada Federal Output-Based Pricing System (OBPS)	OBPS has been in force since 2019 (>5 years)	Canada is a developed country in North America, therefore not considered to have a similar local context to Viet Nam	OBPS is a baseline-and-credit ETS, providing a design variety in the case study and thus included in the case study
Alberta Technology Innovation and Emissions Reduction System (TIER)	Alberta TIER was established in January 2020 i.e. ~5 years since its first operation. Alberta TIER has also undergone major amendments which can provide good insights for Viet Nam	Alberta is part of Canada, a developed country in North America therefore not considered to have a similar local context to Viet Nam	Alberta TIER is a subnational baseline-and-credit ETS with an intensity-based cap setting, providing a design variety in the case study and thus included in the case study

Source: Compiled by the Consultant

III.3. Case studies on international ETSs

III.3.1. European Union ETS

III.3.1.1. Brief description

The EU ETS, launched in 2005 following the adoption of the EU ETS Directive (2003), is the oldest ETS system in the world. It was established in response to the Kyoto Protocol (1997), which introduced key principles for international emission trading, including: (i) emissions targets for industrialised countries and (ii) flexible mechanisms allowing countries to exchange emissions units between countries as an international emissions trading system (Climate Policy Info Hub, n.d.).

Over the years, the EU ETS has undergone multiple reforms, with the latest in 2021 to align with the EU's 2050 climate neutrality target as part of the EU's climate commitment under the Paris Agreement. Currently, the EU ETS is in its fourth phase (2021 - 2030).

The key information about the EU ETS is provided in Table below:

Table 5: EU ETS summary

European Union Trading Scheme	
Location	European Union member states, Iceland, Liechtenstein, Norway, as well as Northern Ireland for electricity generation
Scheme type	ETS, established through a cap-and-trade
Status	In force and mandatory since 2005
Sectors covered	Power, industry, aviation, and maritime
GHGs covered	CO_2, HFCs, N_2O, PFCs, SF_6
Emissions coverage	38% of the EU's GHG emissions, which, in 2022, totalled 3.2 billion tCO_2e

Source: ICAP, 2024a

III.3.1.2. ETS design formulation

a. ETS scope coverage

In determining sectoral coverage for the system, the EU chose to focus on the sectors with the highest emissions level instead of having broad sectoral coverage. In the first phase, the EU ETS system covered power stations and other combustion installations with >20 MW thermal-rated input and industrial sectors such as oil refineries, iron, cement and steel plants (ICAP, 2024b). In Phase 2, the geographical coverage was expanded to include non-EU countries, namely Iceland, Liechtenstein, and Norway and the aviation sector was added to the system, which continued to Phase 3. In Phase 4, the maritime sector was added to the mix.

In terms of GHG coverage, at first, the EU ETS only covered CO_2. Starting from Phase 2, the system began to expand its GHG coverage to include other gases and eventually include GHGs of HFCs,

N_2O, PFCs, and SF_6. In 2022, 8,640 installations, and 390 aircraft operators were covered by the EU ETS (ICAP, 2024b). Overall, EU ETS scope & coverage is summarised in Table below:

Table 6: EU ETS scope & coverage

	Years	Sectoral Coverage	GHG Coverage
Existing EU ETS			
Phase 1	2005-2007	Power generation and energy-intensive sectors	CO_2 only
Phase 2	2008-2012	Expanded to include additional sectors: aviation (from 2012), aluminium and chemicals (partial coverage for some processes)	CO_2, N_2O (from nitric acid production), and PFCs (from aluminium production)
Phase 3	2013-2020	Continued coverage of existing sectors; partial coverage of more chemicals, aluminium, and added more aviation activities	CO_2, N_2O (from nitric acid, adipic acid, glyoxal, and glyoxylic acid production), PFCs, and SF_6 (from magnesium production and other uses)
Phase 4	2021-2030	Expanded by including maritime sectors (from 2024)	CO_2, N_2O, PFCs, SF_6, and potential further expansion of GHGs in new sectors
EU ETS2			
Phase 1	2027-onward	Fuel combustion in buildings, road transport and additional sectors (mainly small industry not covered by the existing EU ETS)	CO_2

Source: Compiled by the Consultant based on ICAP, 2024a and European Commission, n.d.

By focusing on high-emission sectors, it allows the EU to reduce emissions while simplifying administrative and monitoring systems. Moreover, it minimises and potentially mitigates unnecessary economic disruptions and carbon leakage. Ultimately, the EU can avoid the high cost of reducing emissions in smaller sectors that might not be as cost-effective as the high-emitting sectors.

In selecting the GHG emissions to cover, the EU started by covering CO_2 for its ETS. Apart from its status as the largest source of emissions, CO_2 is relatively easy to monitor, measure, and verify compared to other GHGs, allowing for more accurate and consistent reporting. Hence, limiting the initial focus to CO_2 simplifies the overall design and once again aligns with EU ETS's aims to reduce emissions cost-effectively (World Bank, 2021).

Additionally, starting from 2027, the ETS2 will be enacted by the EU to complement and over time merge with the existing EU ETS. It will cover CO_2 emissions from buildings, road transport and additional small sectors not covered by the existing EU ETS (European Commission, n.d.-d).

b. ETS cap setting

The main principle that is used by the EU to determine the cap of the ETS throughout every phase is the continuous adjustment of the cap to ensure its alignment with the EU climate target - 55% net emissions reductions compared to 1990 levels (ICAP, 2024b). At first, the bottom-up approach was adopted to provide flexibility for member states to be suitable for their local context. However,

it has led to a too lenient cap, resulting in low carbon prices and distortion of competitiveness between countries. Subsequently, it was shifted to a top-down approach as it allows the EU to align the ETS cap directly with its broader climate goals, ensuring that the system supports the EU's contribution to global climate agreements like the Paris Agreement (European Commission, 2023).

The EU ETS sets a fixed, absolute limit on the total amount of GHG emissions that can be emitted by the sectors it covers. This cap is reduced over time to ensure that emissions decrease in line with the EU's climate targets. This approach guarantees a predictable reduction in emissions, as the total number of allowances available in the system is strictly controlled. In 2023, the European Parliament and the European Union adopted a set of laws introducing a reform of the EU ETS, which includes an increase in the ETS' linear reduction factor from 2.2% to 4.3% between 2024 and 2027 and to 4.4% between 2028 and 2030 (European Commission, 2023).

The evolution of the EU ETS cap setting can be seen as follows:

- Phase 1: 2,096 $MtCO_2e$ in 2005
- Phase 2: 2,049 $MtCO_2e$ in 2008
- Phase 3: 1,816 $MtCO_2e$ in 2020
- Phase 4: 1,386 $MtCO_2e$ (2024, electricity and heat generation, industrial manufacturing and maritime transport) and 28.9 $MtCO_2e$ (2024, aviation)

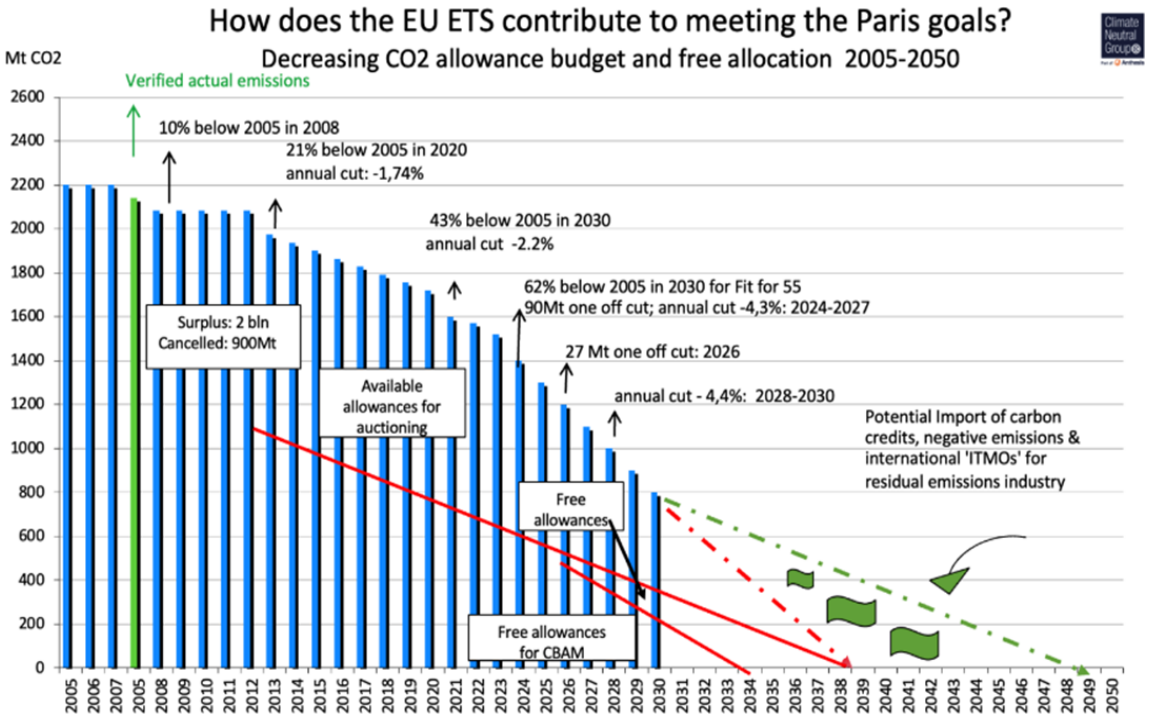

Figure 8: Tightening EU ETS

Source: Climate Neutral Group, 2023

c. ETS allowance allocation

Initially, the free allocation method was used as the main approach in the early stage of the EU ETS, with almost 100% of allowances given for free in Phase 1 and Phase 2, the share of free

allowances was lowered to ~90%. Since Phase 3, auctioning has been the main method for distributing allowances, accounting for up to 57% of the cap distribution (European Commission, n.d.-c). It is a translation of the 'polluter pays' principle, ensuring that those who emit pollutants pay (European Commission, n.d.-b). In the first half of 2023, 109 auctions were held and in 2022, 222 auctions were held, of which two were cancelled due to a technical problem (February 2022) and the total volume of bids fell short of the volume of auctioned allowances for Poland (March 2022) (EU Monitor, 2023). Additionally, while auctioning is the primary method for allowance allocation, free allocation is still adopted by the EU ETS to mitigate the risk of carbon leakage in the current Phase 4. These sectors will receive 100% of their allocation for free. For less exposed sectors, free allocation is foreseen to be phased out after 2026 from a maximum of 30% to 0 at the end of phase 4 (2030) (European Commission, n.d.-a). The reasoning behind this is similar to why it was adopted in Phase 1, free allocation can serve as a transitional measure primarily addressed to the EITE sectors (European Commission, 2023).

The free allocation rules have been revised for Phase 4 (2021-2030). Sectors at the highest risk of carbon leakage i.e. relocating to outside the EU will continue to receive 100% of the allocation for free, whereas for less exposed sectors, free allocation is foreseen to be phased out after 2026 from a maximum of 30% to 0% at the end of Phase 4 in 2030, except for district heating (European Commission, n.d.-a). The sectors deemed to be at risk of carbon leakage, updated in 2019 and valid for the period 2021-2030, are determined based on the EU Directive 2003/87/EC, which considers at the sectoral level, the risk of carbon leakage. This sector classification known as NACE is the statistical classification of economic activities, with “NACE-4” the level where there is optimal data activity for defining the sectors precisely. A carbon leakage factor is calculated by multiplying the sector’s intensity of trade with third countries by the sector’s emission intensity (European Commission, 2019). Further details as to how the sector intensity of trade and the sector’s emission intensity are determined can be found in the EU Directive 2019/708/EC.

As per 2024, the main price of EU ETS allowances is USD 61.3/tCO_2e (World Bank, n.d.).

III.3.1.3. ETS Implementation and challenges

In almost twenty years since its establishment, the system has undergone several development phases. In Phase 1 (2005-2007), the system focused on establishing the price and the overall business process. The first phase started as a 3-year pilot covering only CO_2 emissions from power and energy-intensive industries. During this period, the system successfully established a price for carbon-free trade and the overall business process of the system.

Moving on to Phase 2 (2008-2012), the cap was lowered and the use of carbon offset was allowed. Afterwards, in Phase 3 (2013-2020), the system got stricter by lowering the cap, broadening the sectoral coverage, and limiting the use of carbon offset. Lastly, in Phase 4, the system increased its stringency by adding the maritime sector, lowering the cap to 1,386 MtCO_2e in 2024 compared to 1,816 MtCO_2e in 2020, and strengthening the Market Stability Reserve.

Currently, Phase 4 of the system regulates 9,030 entities that represent 38% of the EU’s total emissions, with a 1,386 MtCO_2e cap for the power, industry, and maritime sectors as well as 28.9 MtCO_2e for the aviation sector. Each year, the cap is updated to be aligned with the 2030 climate target of at least 55% net emissions reductions compared to 1990 levels (ICAP, 2024b).

Furthermore, the use of offset as an alternative compliance method has been completely phased out in Phase 4, citing environmental integrity concerns and impacts of the use of offset on the EU ETS on allowance prices as the reasons for the phase out (ICAP, 2023).

Due to the adoption of the ETS system, EU member states can reduce their emissions by 15.5% in 2023 compared to 2022 levels, putting the EU on track to achieve the 2030 target of 62% emission reduction compared to 2005 levels (European Commission, 2024). Moreover, the EU ETS has generated substantial revenue over the years, amounting to over EUR 200 billion since 2013 (European Commission, n.d.-b). The main allocation for this revenue goes to advance climate action, including energy transformation financing, industrial decarbonisation innovation, and social measures to support green transition.

Nevertheless, the system has faced several challenges over the years, notably the oversupply of allowances due to its free allocation approach in the early stage, leading to a very low carbon price. Moreover, as members adopted the grandparenting approach, they often overestimated the historical emissions, resulting in a mismatch between supply and demand. It has led to the establishment of the MSR in 2018, which regulates that if the number of allowances reaches a certain level, the MSR will reduce the volume auctioned in the subsequent year by 12 percent (Econstor, 2020).

The European Commission introduced the Carbon Border Adjustment Mechanism (CBAM) in October 2023, aiming to decarbonise energy-intensive sectors while minimising carbon leakage risks. CBAM is being implemented in phases and is intended to align with the plans for the phasing out of the free allowances in the EU ETS described above. Currently, CBAM is in its transitional phase from 1 October 2023 until 1 January 2026, when it becomes fully operational, where there will be financial obligations for the importers of CBAM goods. The cement, iron and steel, aluminium, fertilisers, electricity, and hydrogen sectors will be covered as a start, and these importers will have to pay for CBAM certificates based on the difference between the carbon price in the EU and the carbon price of the country producing the CBAM goods.

III.3.2. South Korea ETS

III.3.2.1. Brief description

The first nationwide mandatory ETS to launch in East Asia, South Korea's cap-and-trade program is currently in its third phase, which runs from 2021 to 2025 (ICAP, 2024a). 804 of the country's largest emitters are regulated by the scheme, accounting for 89% of the country's GHG emissions. The scheme serves as a key measure to meet South Korea's long-term GHG emission reduction targets (ICAP, 2024a), which includes reducing the country's GHG emissions by 40% by 2030 relative to 2018 levels and achieving carbon neutrality by 2050 (Climate Action Tracker, 2023). The key information about the ETS is provided in Table below:

Table 7: South Korea ETS summary

European Union Trading Scheme	
Location	South Korea
Scheme type	ETS, established through a cap-and-trade

Status	In force and mandatory since 2015
Sectors covered	Waste, transport, maritime, domestic aviation, buildings, industry and power
GHGs covered	CO_2, CH_4, N_2O, PFCs, HFCs and SF_6
Emissions coverage	88.5% of the country's GHG emissions as of 2021

Source: ICAP, 2024

III.3.2.2. ETS design formulation

a. ETS scope coverage

The South Korea ETS covers power generation, industry, buildings, maritime, transport, aviation, and waste, making it one of the ETSs with the widest coverage globally. It also covers a wide range of GHGs, including CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 from both direct emissions and indirect emissions. The coverage within the sectors of the South Korea ETS has been expanded over the years. In Phase 3, the coverage within the transport sector was widened to include freight, rail, passenger, and maritime shipping and the construction sector was added to the ETS coverage. This change brought the total covered sub-sectors to 69 (ICAP, 2024a).

Participation in the South Korea ETS is mandatory for any company in the covered sectors with an annual GHG emissions of 125,000 tCO_2 or above over 3 consecutive years or business facilities with an annual GHG emissions of 25,000 tCO_2 or above over 3 consecutive years. Any other entities in the covered sectors regardless of their emissions level can apply to voluntarily participate in the ETS (ADB, 2018). In Phase 1, the South Korea ETS covered 534 entities, while in Phase 2, the ETS covered 591 entities (Environmental Policy Bulletin, 2015). As of 2023, 804 entities were covered by the ETS (ICAP, 2024d).

Table 8: South Korea ETS scope & coverage

	Years	Sectoral Coverage	GHG Coverage
Phase 1	2015-2017	23 sub-sectors from five sectors: heat and power, industry, buildings, waste, and transportation (domestic aviation)	CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (indirect CO_2 is included)
Phase 2	2018-2020	62 sub-sectors from six sectors: heat and power, industry, building, transportation, waste and the public sector	CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (indirect CO_2 is included)
Phase 3	2021-2025	60 sub-sectors, in which the coverage within the transport sector was widened to include freight, rail, passenger and maritime shipping and the construction industries were brought in.	CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (indirect CO_2 is included)

Source: Compiled by the Consultant based on ICAP, 2024b

b. ETS cap setting

The cap setting of South Korea ETS is historically tied to the country's national and sectoral targets or strategies. In the beginning, the sectoral targets were set based on data collected from the industries and consultations with industry players, particularly those from energy-intensive industries (ADB, 2018).

- Phase 1 (2015 - 2017): In the first phase, the government set the ETS cap based on the country's GHG reduction target under the Copenhagen Accord which was to reduce its emissions by 30% compared to BAU emissions by 2020. The cap for Phase 1 was calculated using the following formula (Environmental Policy Bulletin, 2015):

$$ETS\ BAU = National\ BAU \times \frac{ETS\ GHG\ Emissions}{National\ GHG\ Emissions}$$

  Using the above formula, the overall cap for the ETS Phase I was 1,690 million tCO_2e, including reserves for new entrants, covering 83% of the country's emissions in 2017 (Statista, n.d.-b).

- Phase 2 (2017 – 2021): In the second phase, the cap was set to align with the sectoral carbon budget according to the Roadmap for Achieving 2030 National GHG Reduction Targets. This amounted to 1,777 million tCO_2e, which included 134 million tCO_2e reserves for new entrants (Asia Society Policy Institute, n.d.). The higher cap in Phase 2 reflects the coverage expansion of the South Korea ETS. It has resulted in a coverage of 86% of the country's emissions in 2020 (Statista, n.d.-b).

- Phase 3 (2021 - 2025): In the third phase, the annual cap for the first three years (2021-2023) was set at 589.3 million tCO_2e, which then reduced to 567.1 million tCO_2e for the final two years. This amounts to a total cap of 3,048 million tCO_2e for Phase 3, covering 89% of the country's emissions (Statista, n.d.-b). Although the annual average cap increases due to the coverage expansion of the ETS, the ETS emissions in Phase 3 actually would see a 4% decrease compared to Phase 2 (ICAP, 2020).

c. ETS allowance allocation

The approach for allowance allocation in South Korea ETS has gradually shifted as the ETS has evolved. In Phase 1, 100% of the allowances were freely given to the ETS participants. This was done to ensure a smooth launch of the system and avoid excessive negative economic impacts on the industries (ADB, 2018).

Starting from Phase 2, the South Korea ETS introduced auctioning whereby ETS participants can purchase allowances from the government. In Phase 2, 3% of allowances were up for auction, while in Phase 3, 10% of allowances were available for auction. The remaining allowances were then freely allocated (ADB, 2018).

The auctions are held monthly and are open to all covered entities except those which receive free allowance allocation, with a list of eligible bidders published by the Ministry of Environment. To ensure price stability and avoid market speculation, the auction has a few restrictions, including the introduction of a price floor to the auction allowances and a maximum purchase percentage of the auction amount. In Phase 2, a bidder was not allowed to purchase more than 30% of the auction amount, while in Phase 3 the maximum percentage was reduced to 15% (ICAP, 2024d).

The South Korea ETS allowance allocation follows different methods for different industries. In Phase 1, the cement (grey clinker), oil refining and domestic aviation industries received their allowances based on the benchmarking method, while for the other industries, the grandfathering method was used. The benchmarking approach was extended to power generation, industrial complex, district heating and cooling, petrochemical, and waste industries in Phase 2, while steel, petrochemical, paper and wood processing, as well as building industries, started to use the benchmarking approach in Phase 3 (ICAP, 2024d) (Asia Society Policy Institute, n.d.).

The following formula was used to calculate the allowance allocation in Phase 3 (ICAP, 2024d):

- Benchmark allocation: Benchmark value (tCO_2e/t) x historical activity level (t) x correction factor x carbon leakage factor
- Grandparenting allocation: Average GHG emissions of base year x correction factor x carbon leakage factor

The carbon leakage factor is 1.0 for the EITE sectors, while the carbon leakage factor for non-EITE sectors is 0.9.

For the EITE sectors, the government applies special provisions whereby they are eligible to receive a 100% free allocation if they meet the predetermined criteria. The criteria for EITE are set against production costs and trade intensity benchmarks and have gradually changed as the ETS evolved.

In Phase 2, a company is considered an EITE and eligible for 100% free allocation if:

- The emission reduction compliance causes additional production[2] cost by more than 5%, and the trade intensity[3] is more than 10%, or
- The emission reduction compliance causes additional production costs by more than 30%, or
- The company's trade intensity is more than 30%.

In Phase 3, a company is considered an EITE if the multiplication of the production cost and trade intensity equals or exceeds 0.2% (ICAP, 2024d).

As of 2024, the main price of South Korea ETS allowances is USD 6.3/tCO_2e (World Bank, n.d.).

III.3.2.3. ETS implementation and challenges

From the outset, the South Korea ETS was planned to be implemented in phases with the first two phases planned to last for three years and the subsequent phases to last for five years. This phased implementation allows progressive evaluations and revisions to the ETS design which are reflected in the ETS Master Plan for each phase. The Table below shows the key characteristics of the South Korea ETS phases.

[2] Additional production cost: a direct and indirect increase in production cost due to emission reduction compliance

[3] Trade intensity: an entity's integration with the world economy. A higher trade intensity means an economy is more susceptible to external shocks in the world economy

Table 9: Key characteristics of South Korea ETS

Characteristic	Phase 1	Phase 2	Phase 3
Major goal	• Building up operational capacity • Ensuring the smooth launch of the system	• Considerable emission reduction	• Meeting the emission reduction target
Allowances	• Enhancing the flexibility of the system (e.g., offset credits use) • Establishing the basis for accurate MRV	• Expanding the scope of the system • Increasing the emission reduction target • Upgrading standards for emissions reporting and verification	• Encouraging all entities to reduce emissions voluntarily • Increasing flexibility in the supply of credits through participation in third-party trading
Institutional Operation	• 100% free allocation • Utilising experiences from Energy and GHG Target Management System	• 97% of allowances distributed for free, 3% auctioned • Improving allowance allocation approach	• Less than 90% of allowances distributed for free, more than 10% auctioned • Implementing an improved allowance allocation approach

Source: ADB, 2018

The Table shows that from the beginning, the South Korea ETS was designed in a gradual way to ultimately help South Korea reduce its emissions. Prior to the implementation of South Korea ETS, the government started the building blocks for the operationalisation of the ETS by establishing the necessary regulations and guidelines, and more importantly, building the capacity within the industry. The Target Management System (TMS), established through the Framework Act on Low Carbon Green Growth 2010, became an important stepping stone for the implementation of the ETS (ADB, 2018). The TMS, which required high-emitting entities to report their emissions against entity-specific emissions reduction targets, allowed the entities to familiarise themselves with GHG reporting, MRV and build internal capacity relating to emissions reduction. On the government side, the emissions reporting through TMS helped them understand the industry-level emissions and inform the cap setting and allowance allocation for the ETS (ADB, 2018).

This shows that industry participation has become an important aspect of South Korea ETS design. Currently, the government is developing the plan for South Korea ETS Phase 4, which will align with South Korea's more ambitious 2030 emissions reduction targets. For this purpose, the government has been conducting consultations with industry representatives since 2022 and is reviewing proposals from the industry, which, if approved, could be included in the new rules under Phase 4 of the ETS (ICAP, 2022).

Despite the careful planning and consideration by the government, South Korea ETS still faced challenges during its implementation, particularly during its early stage. During Phase 1 of South Korea ETS, there were liquidity issues where the number of allowances traded was much lower than the amount of allowances allocated during Phase 1. This was attributed to the unrestricted banking rules whereby companies are allowed to bank their surplus allowances for use in the subsequent compliance period. As such, many companies were reluctant to sell their surplus allowances to avoid the need for buying more expensive allowances in the subsequent compliance period if they exceeded their free allocations.

Furthermore, the grandparenting allocation method, where the allowance allocation is based on the historical emissions, could have perverse consequences. If the historical emissions of a company are low, the allowance allocation will also be low. Since companies under the South Korea ETS are prone to gain as many allowances as possible, they may become reluctant to reduce emissions in their facilities, which will undermine the effectiveness of ETS in reducing emissions in the country (Hyuk, J, 2020).

III.3.3. China National ETS

III.3.3.1. Brief Description

China National ETS started to operate in 2021, following the pilot implementation of the system in eight of China's subregions. It aims to support the effort of controlling and gradually reducing carbon emissions in the country. Moreover, it regulates more than 2,000 companies from the power sector, covering more than 4 billion tCO_2 and accounting for over 40% of China's carbon emissions. It is expected that the system will be gradually expanded, covering seven other sectors: petrochemicals, chemicals, building materials, steel, nonferrous metals, paper, and domestic aviation. Nevertheless, the timeline of the above expansion remains unclear as the system does not have specific phases of development (ICAP, n.d.-a). The key information about the ETS is provided in Table below:

Table 10: China National ETS summary

China National Emissions Trading Scheme	
Scheme type	ETS, established through a cap-and-trade
Status	In force since 2021 following the implementation of 8 subnational ETS pilots: Beijing (2013), Chongqing (2014), Fujian (2016), Guangdong (2013), Hubei (2014), Shanghai (2013), Shenzhen (2013) and Tianjin (2013)
Sectors covered	Power (2,000 companies with annual emissions of more than 26,000 tCO_2 including combined heat and power, as well as captive power plants in other sectors)
GHGs covered	CO_2 (including direct emissions from electricity and heat consumption)
Emissions coverage	Around 40% of national CO_2 emissions

Source: Compiled by the Consultant based on ICAP, n.d.-a

III.3.3.2. ETS design formulation

a. ETS scope coverage

In the first (2019-2020) and second compliance (2021-2022) periods up until now, China National ETS only covers the CO_2 emissions of the power sector (including combined heat and power, as well as captive power plants of other sectors), amounting to 2,257 entities in the system. The scope is expected to be expanded, with no specific timeline for the expansion (ICAP, n.d.-a).

b. ETS cap setting

The cap setting of China National ETS is adopting an intensity-based emission cap (bottom-up cap) determined by each regulated entity's calculation of their product's emissions generation. According to the Ministry of Ecology and Environment's Measures for the Management of Carbon Emissions Trading (Trial), the cap-setting under China National ETS must consider various factors, such as economic growth, industrial structure adjustment, energy structure optimisation, and cooperative control. Therefore, an intensity-based cap is chosen due to its ability to maintain economic production level, as well as offering more flexibility and political acceptance (Asia Society, 2023).

The national cap is then the sum of allocations of the individual covered entities, which resulted in a cap of around 5,000 million tCO_2 in 2021 and 2022, accounting for 40% of national CO_2 emissions (ICAP, 2024a). However, the system currently has no specific phases, and the current regulation only applies to the first and second compliance periods. Hence, it is interesting to see how this system developed to support China's target of reducing CO_2 emissions per unit of GDP by over 65% from 2005 levels (ICAP, 2024a).

c. ETS allowance allocation

In its current implementation, all allowances are distributed for free, adopting output-based benchmarking as the main allocation method. It has four different benchmarks: conventional coal plants below 300 MW, conventional coal plants above 300 MW, unconventional coal, and natural gas.

The allocation itself undergoes two steps (Asia Society, 2023):

- Pre-allocation of allowances: Entities receive allowances with the value of 70% of their historical output level or verified historical emissions as pre-allocation.
- Allowances adjustment: The pre-allocated allowances are then adjusted to reflect the actual generation. Subsequently, entities with allowance surpluses from the pre-allocation stage need to return the allowance, whereas additional allowances are allocated to entities that have a deficit after adjustment to achieve a maximum of 80% of their verified emissions.

The calculation formula is as follows (China Ministry of Ecology and Environment, 2024):

$$Unit\ Quota = Unit\ power\ generation\ CO_2\ quota + CO_2\ quota\ for\ heating\ unit$$

Where:

- Unit power generation CO_2 quota = Unit power generation × power generation base value × Unit peak load correction factor

- CO_2 quota for heating unit = Unit heating x Heating base value
- Unit peak load correction factor = Peak load correction factor for conventional coal-fired units is 1.015 when the unit load (output) factor is <65%. Otherwise, it is 1.

Base value is shown in Table below (China Ministry of Ecology and Environment, 2024):

Table 11: Base value for allowance allocation in China ETS

	Category	Power generation base value (2024)	Heating generation base value (2024)
1	Conventional coal-fired units above 300MW	0.7910 tCO_2/MWh	0.1033 tCO_2/GJ
2	Conventional coal-fired units of 300MW and below	0.8049 tCO_2/MWh	
3	Unconventional coal-fired units	0.8244 tCO_2/MWh	
4	Gas unit	0.3288 tCO_2/MWh	0.0533 tCO_2/GJ

The allowances can be traded in a secondary market managed by the Shanghai Environment and Energy Exchange. Moreover, to further develop the ETS system, the introduction and gradual expansion of the auctioning method is planned. However, the timeline for implementation remains unclear, as no specific schedule has been established (ICAP, 2024a).

As of 2024, the main price of China National ETS allowances is USD 12.6/tCO_2e (World Bank, n.d.).

III.3.3.3. ETS implementation and challenges

China National ETS system is mainly determined by several variables such as economic growth, industrial structure, and energy optimisation. Therefore, adopting bottom-up and intensity-based approaches is most suitable considering China's current economic development and power sector characteristics. Subsequently, the approach obtained all stakeholders' buy-in from all facets such as government, industry, and consumers. Hence, the approach has allowed China to maintain its economic ambitions while being the world's largest ETS by volume of emissions covered at over 4 billion tCO_2e per year (S&P Global, 2023).

Despite the above impacts, China National ETS faced several challenges during its first compliance period. First, there were market liquidity issues as market participation was low. Most companies only participate in the market to comply with their obligations, and as such, only perform transactions towards the end of the compliance period, leaving the market activities low most of the year (Dialogue Earth, 2023). Furthermore, due to market uncertainty, several regulated entities are holding onto their surplus credits. To counter the surplus, Ministry of Ecology and Environment reduced carbon allowances in the second compliance and the upcoming period (Carbon Pulse, 2024), pressuring regulated entities to reduce their emissions.

There have also been cases of data fraud where some companies manipulated their emissions data, affecting at least one million tonnes of allowances worth USD 7 million. Indeed, data issues are hindering China from expanding its ETS coverage sooner. To address this issue, Ministry of Ecology and Environment instructed companies to perform a monthly inspection into the key parameters of their emissions and submit the results online. Ministry of Ecology and Environment

is also looking into building a long-term mechanism to manage and improve data quality (Carbon Pulse, 2024).

In addition to the above, the first compliance period of the national ETS was noted as ineffective in reducing emissions in the power sector due to several reasons. First, the free allowances were sufficiently allocated to power plants, disincentivising them to reduce emissions. The use of offsets also exacerbated the allowance surplus, with the total excess allowance and offsets reaching 360 million allowances in the second compliance period (The Oxford Institute of Energy Studies, n.d.)

III.3.4. Mexico ETS

III.3.4.1. Brief description

The Mexico ETS started in 2020, making it the first ETS in Latin America. The system covers power and industry sectors' CO_2 emissions that emit at least 100,000 tCO_2 per year in its current pilot phase. During the pilot phase, regulated entities are not yet imposed with economic sanctions or penalties as it aims for familiarisation with the policy. The system represents around 40% of national GHG emissions and 90% of emissions reported in the National Emissions Registry (RENE) (Allcot trading, 2022). It was previously expected that the system would enter its operational phase in 2024, subject to the result of the pilot phase. However, due to the complex process of establishing final regulations, the delay is expected to continue, and it is not clear when the ETS will enter the full operational stage. The key information about the ETS is provided in Table below:

Table 12: Mexico ETS summary

Mexico Emissions Trading Scheme	
Location	Mexico
Scheme type	ETS, established through a cap-and-trade
Status	In force since 2020 (pilot)
Sectors covered	Power, Industry
GHGs covered	CO_2
Emissions coverage	Around 40% of national GHG emissions

Source: Compiled by the Consultant based on ICAP, n.d.-b

III.3.4.2. ETS design formulation

a. ETS scope coverage

The Mexico ETS started by covering the energy and industrial sectors in the pilot phase. It specifically targets installations with annual direct CO_2 emissions of at least 100,000 tCO_2, covering approximately 295 regulated entities. The energy sector targets all lines of production, starting with fossil fuel extraction, production, transport, and distribution, while the industrial sector includes industries such as automobiles, cement, and petrochemicals. As the pilot phase aims to familiarise the industry with the ETS mechanism, the approach to focus on high-emitting sectors allows Mexico to simplify the monitoring and administration process (World Bank, 2021).

b. ETS cap setting

Mexico's main principle in cap setting is to ensure that the cap aligns with the country's NDC target (S. Lucatello, 2022) of an unconditional emissions reduction target of 35% compared to a BAU scenario (NDC Partnership, n.d.). In its first two years, the ETS set a cap of 271.3 $MtCO_2$ and 273.1 $MtCO_2$, respectively. Additionally, Mexico ETS sets up a reserve function to safeguard its aim to avoid economic impact for regulated entities in the pilot phase (ICAP, 2024a). The above reserves are as follows:

- Auction reserve (equivalent to 5% of the cap, for regular auctions, which have not yet happened);
- New entrants' reserve (equivalent to 10% of the cap, for new entrants as well as increases in production among existing regulated entities); and
- General reserve (equivalent to 5% of the cap, for ex-post adjustment allocation for entities with higher emissions relative to their baselines).

c. ETS allowance allocation

During the pilot phase, all entities are entitled to the allowances for free, equivalent to 100% of their most recent verified emissions (grandfathering). For participants who have not yet verified their emissions, the initial allocation is determined using their historical emissions. Additionally, participants may request extra allowances if an increase in production leads to higher direct CO_2 emissions from stationary sources. It is not clear whether ETS Mexico will change their approach in allocating the allowances after the pilot phase ends. As of 2024, all of Mexico's ETS allowances are still free (World Bank, n.d.).

III.3.4.3. ETS implementation and challenges

As the first to adopt an ETS in Latin America, Mexico shows a great intention to meet its climate goals while incentivising those who can reduce emissions. It is a product of collaboration between domestic and international stakeholders, orchestrated by Mexico's Ministry of Environment and Natural Resources (IKI, 2025). In its pilot phase, the ETS was designed to accommodate and familiarise all stakeholders by aiming to avoid any economic impacts for regulated entities. However, due to its orientation to avoid costs, the trading is happening without cash transactions, resulting in a struggle to establish carbon prices (S&P Global, 2024).

More broadly, various sources attributed the delays to a fully operational ETS to a lack of political will around climate change policies of the then-administration, regulatory uncertainty around the ETS policy amid changes to energy and climate mitigation laws, and execution capacity of the regulator, Secretariat of Environment and Natural Resources of Mexico (SEMARNAT) (Climate Action Tracker, 2022), (Quantum Commodity Intelligence, 2024), (Daniela Villanueva and Agamoni Ghosh, 2024). It is worth noting that before the introduction of the pilot ETS, from 2017 until 2023, carbon taxes were implemented in eight of the 32 states: Durango, Estado de México, Guanajuato, Queretaro, San Luis Potosi, Tamaulipas, Yucatan, and Zacatecas. More recently, until the end of 2024, carbon taxes were approved to be implemented in Colima (Quantum Commodity Intelligence, 2024), Morelos and Mexico City (Carbon Pulse, 2025). In addition, an upstream nationwide carbon tax had been implemented in 2014 on fossil fuel imports, with the exclusion of

natural gas, based on the additional CO2 emission content compared to natural gas. Moreover, the subnational carbon tax schemes vary in terms of the choice of design elements such as covered gases and sectors, use of offsets, as well as price - the carbon tax rates range from MXN 45 (USD 2.72) in Guanajuato to MXN 607.99 (USD36.70) in Queretaro (World Bank, n.d.).

Since the election of the new administration in 2024, the federal government and state governments have been working to streamline the national ETS with the subnational carbon taxes. Detailed guidelines such as the emissions threshold, covered sectors, role of offsets are being developed, and the national ETS is expected to be operationalised by the end of 2025, or in 2026, according to different sources (Quantum Commodity Intelligence, 2024), (Carbon Pulse, 2025).

III.3.5. Indonesia ETS

III.3.5.1. Brief Description

Following its implementation of the ETS pilot in 2021, the government enacted an intensity-based ETS for the power subsector in 2023. In its current phase (2023-2024), it regulates coal-fired power plants with a capacity of 25 MW to ≤ 100 MW, covering 99 coal-fired power plants connected to the state-owned grid. In essence, the policy aims to support Indonesia's goal of 31.9% GHG emission reductions below BAU in 2030 (ICAP, 2024a). The key information about the ETS is provided in Table below:

Table 13: Indonesia ETS summary

Indonesia Emissions Trading Scheme	
Location	Indonesia
Scheme type	ETS, established through a cap-and-trade
Status	Commenced since 2023
Sectors covered	Power sub-sector: Coal-fired power plant
GHGs covered	CO_2, CH_4, N_2O
Emissions coverage	81.4% of the country's power generation capacity

Source: Compiled by the Consultant based on ICAP, 2024a

III.3.5.2. ETS design formulation

a. ETS scope coverage

Currently, Indonesia ETS coverage is still limited to coal-fired power plants connected to the state-owned electricity grid, covering 146 installations from 99 coal-fired power plants, with the GHGs covered including CO_2, CH_4, and N_2O. It encompasses three phases of development: (i) Phase 1 (2023-2024); (ii) Phase 2 (2025-2027); and (iii) Phase 3 (2028-2030).

Phase 1 regulates coal-fired power plants with a capacity of 25 MW to ≤ 100 MW, mine-mouth coal-fired power plants with a capacity of ≥ 100 MW, non-mine-mouth coal-fired power plants with a capacity of 100 MW to ≤ 400 MW: 1.0 tCO_2e/MWh, and non-mine mouth coal-fired power plants

with a capacity of > 400 MW:0.9 tCO_2e/MWh. Moving to Phase 2, the system plans to regulate coal-fired power plants with a capacity below 25 MW, gas-fired power plants, combined cycle power plants, and other coal-fired power plants not connected to the state-owned grid. Eventually, in Phase 3, it aims to expand to cover all fossil fuel power plants regardless of their connection to the state-owned grid. Additionally, Ministry of Environment and Forestry (MoEF) has indicated that the ETS will be implemented in other sectors as well, such as forestry, industrial processes and product use, agriculture, and waste management (ICAP, 2024c).

The limited initial focus that Indonesia ETS adopted might come from the associated constraints that developing countries have. Focusing on the high-emission subsector allows the system to reduce emissions at a lower cost compared to imposing it on all sectors (World Bank, 2021). Furthermore, restricting the subject to entities connected to the state-owned grid streamlines the monitoring mechanism as the grid is solely owned by a state-owned utility company, Perusahaan Listrik Negara.

b. ETS cap setting

In Indonesia ETS, the cap setting is determined by the technical ministry of the covered sectors. In this case, Ministry of Energy and Mineral Resources (MEMR) established it based on the sum of the bottom-up output-based level for all individual covered entities in the power subsector. It is determined by the sectoral emission reduction target and the carbon trading roadmap for the power sector (ICAP, 2024a). Moreover, it adopted an intensity-based cap mechanism, meaning that the number of emission allowances is based on a reference unit - MWh of electricity generated (World Bank, 2021). In Phase 1, the cap for regulated entities is as follows:

- Coal-fired power plants with a capacity of 25 MW to ≤ 100 MW: 1.3 tCO_2e/MWh
- Mine Mouth Coal-fired power plants with a capacity of ≥ 100 MW: 1.1 tCO_2e/MWh
- Non-Mine Mouth Coal-fired power plants with a capacity of 100 MW to ≤ 400 MW: 1.0 tCO_2e/MWh
- Non-Mine Mouth Coal-fired power plants with a capacity of > 400 MW: 0.9 tCO_2e/MWh

In the next phases, the exact number of caps is not yet determined, but it is expected that it will be more stringent. The adoption of an intensity-based mechanism is likely to be influenced by economic considerations, as the cap typically increases or decreases depending on the economy. Hence, it is important to note that adopting such a mechanism might create uncertainty as it highly depends on other variables and ultimately may not reach the environmental objective.

c. ETS allowance allocation

In allocating allowances, the government establishes intensity targets that represent each MWh of electricity that can be generated by regulated entities. In Phase 1, 100% of allowances are being distributed using free allocation by Ministry of Energy and Mineral Resources to regulate power plants. Moreover, in the upcoming phase, the system will also allow the use of auctions conducted through Indonesia's carbon exchange with auction shares and related provisions yet to be determined (ICAP, 2024a).

The free allocation adopts a benchmarking mechanism where Ministry of Energy and Mineral Resources sets the number of allowances allocated based on the installations' average emissions production for every MWh of electricity generated. If the data are unavailable, it will be based on

a comparison with similar installations. In 2024, it is projected that free allocation will be used for at least 75% to 85% of regulated entities as the system tries to integrate its auction mechanism (ICAP, 2024a). As of 2024, the main price of Indonesia ETS allowances is USD 0.6/tCO_2e (World Bank, n.d.).

III.3.5.3. ETS implementation and challenges

Following the enactment of Presidential Regulation 98/2021 on Carbon Economic Value, Indonesia has the framework for implementing a carbon pricing policy, including a domestic ETS. In general strategy, Indonesia ETS plan has three key milestones: (i) the establishment of ETS in the power subsector; (ii) the launch of Indonesia's carbon exchange to facilitate carbon trading; and (iii) the integration of the cap-and-trade-and-tax system, with the latter planned to be enacted in 2025 (Asia Society, n.d.).

Currently, the ETS implementation is still limited in the power subsector, while its expansion to other sectors remains unclear. Therefore, Indonesia ETS development roadmap now only exists in the power subsector, indicating a prioritising approach in determining sectoral coverage for ETS. However, its limited inclusion of regulated entities and the delay of the carbon tax affect the number of transactions circulating in the secondary market system. The secondary market system of carbon exchange, which is intended as the ETS's auction and trading platform, is yet to record any transaction (Katadata, 2024). Furthermore, the delay in the carbon tax implementation might also cause carbon leakages, resource allocation disruptions, and the implementation of cross-border carbon price adjustment systems (AMRO, 2023). Hence, several adjustments are needed to increase Indonesia's carbon market liquidity, leading to many engagements by the government with industry and financial institutions. One notable aspiration has been advocating for lifting the moratorium on international carbon markets. It is argued that, as scaling up the ETS would take some time, reopening the carbon market could not only increase market liquidity but also incentivise emissions reductions in the country (IDX, 2024).

Beyond the limited scope of regulated sectors and the lack of a substantial penalty (i.e. carbon tax), ETS implementation in Indonesia's power subsector faces additional challenges due to pricing mechanisms, heavy subsidies, and the sector's highly centralised system. Firstly, the regulated electricity procurement tariffs imposed by PLN constrain the ability of power generators to internalise carbon pricing within their cost structures. Next, the electricity in Indonesia is heavily subsidised, meaning that any increase in generation costs due to carbon pricing will increase government spending as fossil fuels encompass the majority of the country's energy mix (IESR, 2021). Lastly, most regulated entities are directly/indirectly controlled by PLN (61.79% of Indonesia's total installed power plants are owned by PLN) (PLN, 2023), making it easy to trade allowances at artificially low prices (Ministry of Energy and Natural Resources, 2017).

III.3.6. Canada's federal output-based pricing system (OBPS)

III.3.6.1. Brief description

Canada's federal output-based pricing system (OBPS) is a carbon pricing mechanism which sets a performance (output-based) standard (i.e., GHG emissions per unit of output) based on the national production-weighted average emissions intensity for a given activity in covered sectors. It aims to maintain the carbon price signal for industrial emitters to reduce their GHG emissions

while mitigating the risk of carbon leakage and competitiveness impacts (ICAP, 2024a). The key information about the ETS is provided in Table below:

Table 14: Canada OBPS summary

Canada's federal output-based pricing system	
Location	Canada
Scheme type	ETS, established through a baseline-and-crediting mechanism
Status	In force since 2019
Sectors covered	Power and Industry
GHGs covered	CO_2, CH_4, N_2O, SF_6, HFCs, PFCs
Emissions coverage	9% of the country's GHG emissions

Source: ICAP, 2024a

III.3.6.2. ETS design formulation

a. ETS scope coverage

The OBPS has a focus on targeting the EITE industrial and electricity sectors. Specifically, it obliges all facilities that emit equal to or more than 50,000 tCO_2e. Facilities outside this category can participate voluntarily. In 2023, 37 facilities were covered, consisting of 14 mandatory and 23 voluntary facilities (ICAP, 2024a). Despite having a large number of annual emissions, amounting to 708 million tCO_2e (Statista, n.d.-a), the federal system serves as a backdrop backstop system to ensure consistent carbon pricing where provinces lacked equivalent programs; thus, most emissions are covered in the ETS at the provincial level (ICAP, 2024a).

b. ETS cap setting

The OBPS adopted an intensity-based approach by setting up an output-based standard for a given activity in covered sectors. The limit then comes from the regulated facilities' calculation based on their production level, which they are then required to compensate for if the limit is exceeded. To compensate, regulated facilities can: (i) use purchased surplus credits or their own retained surplus credits from the previous cycle; (ii) pay the carbon price; or (iii) use eligible offset credits. On the other hand, those who are able to perform below the limit receive a surplus credit that they can sell or retain for later (ICAP, 2024a).

c. ETS allowances allocation

The allocation method that the OBPS uses is similar to the free allocation benchmarking approach. The regulated entities received allowances that are calculated based on emissions intensity benchmarks. The benchmark is primarily set using the average emission intensity used by facilities making similar products across Canada (ICAP, 2024a). The approach allows the system to strike a balance of emission reduction and minimise economic disruption as well as carbon leakage. For most industries, the baseline emission level is set to 70% of their average emissions intensity. On the other hand, sectors that are deemed to have high competitiveness risk such as cement, iron,

and steel manufacturing, as well as lime and nitrogen fertilisers, have an OBS of 90% of their average emissions intensity (World Bank, 2021). The following formula is used to calculate the allowance allocation:

$$OBPS = OBS - Reduction\ target$$

Where:

- $OBS = E_j\ x\ GWP_jOBS = E_j\ x\ GWP_j$
- E_j: The quantity of each GHG type ($_j$) from the covered facility during a compliance period
- GWP_j: The global warming potential of the GHG type ($_j$)

Facilities that emit more than their limit have three options to comply: (i) pay the excess emissions charge; (ii) remit a carbon unit for each tCO_2e emitted above the limit; or (iii) use a combination of both. Conversely, those who emit less than the limit can earn Emission Performance Credits (EPCs), which they can sell or bank for future compliance periods

As of 2024, the main price of Canada OBPS allowances is USD 58.9/tCO_2e (World Bank, n.d.).

III.3.6.3. ETS implementation and challenges

The OBPS is part of Canada's strategy to meet its Paris Agreement targets by pricing carbon developed through continuous engagement with industrial players, including in its amendments (ICAP, 2024a). It supports cost-effective emissions reductions while minimising economic disruption for energy-intensive industries. Despite facing dependency on EITE sectors, the adoption of baseline mechanisms and free allocation provides flexibility for industries by rewarding those producing efficiently and penalising those who exceed set standards (Ecofiscal, 2019). In addition, OBPS also channels revenues generated from the system to low-carbon innovation, public goods, and other development objectives such as education and health (ICAP, 2024a).

III.3.7. Alberta Technology Innovation and Emissions Reduction

III.3.7.1. Brief description

The Alberta Technology Innovation and Emissions Reduction (TIER) Regulation is a subnational ETS system designed to meet Canada's federal carbon pricing requirements. Introduced in 2020, TIER replaced the Carbon Competitiveness Incentive Regulation (CCIR) and operates similarly to the federal OBPS.

TIER is a central part of Alberta's strategy to combat climate change, covering 62% of the province's GHG emissions. Ultimately, it seeks to balance environmental goals with the province's reliance on high-emitting industries of power and industries (ICAP, 2024a). The key information about the ETS is provided in Table below:

Table 15: Alberta TIER summary

Alberta Technology Innovation and Emissions Reduction

Location	Alberta
Scheme type	ETS, established through a baseline-and-crediting mechanism
Status	Commenced since 2020
Sectors covered	Power and Industry
GHGs covered	CO_2, CH_4, N_2O, SF_6, HFCs, PFCs
Emissions coverage	62% of Alberta's GHG emissions

Source: Compiled by the Consultant based on ICAP, 2024a

Bill 19, the Technology Innovation and Emissions Reduction Implementation Act, paved the way for Alberta TIER in 2020. In December 2022, TIER regulation underwent its latest amendment which has a primary focus on monetising the TIER system and enhancing the province's approach to reducing emissions from large industrial emitters. The amendments include an annual tightening of facility-specific benchmarks and sector-specific high-performance benchmarks by 2%. The cost of obtaining TIER fund credits will rise each year starting in 2023, and the limit for using credits to meet compliance obligations will also increase by 10% annually, from 60% in 2023 to 90% by 2026. Additionally, sequestration credits and capture recognition tonnes have been introduced as new instruments. Capture recognition tonnes allow large emitters and opt-in facilities to reduce their regulated emissions by accounting for sequestered emissions at carbon capture sites. The amended TIER regulation will remain in effect until 2030, with a mandatory review to be completed by the end of 2026 (ICAP, 2024a).

III.3.7.2. ETS design formulation

a. ETS scope coverage

The TIER Regulation targets large emitters in the power and industry sectors, which emitted equal to or more than 100,000 tCO_2e in 2016, or any subsequent year or have imported more than 10,000 tonnes of hydrogen in 2023 or any subsequent year. Additionally, several types of facilities with emissions below the threshold may opt into the system, the facilities include facilities with emissions under 100,000 tCO_2e/year but more than 2,000 tCO_2e/year; aggregated facilities that include two or more small conventional oil and gas facilities; and facilities emitting between 10,000 to 100,000 tons that compete internationally or are exposed to trade risks. By opting in, entities could be exempt from Canada's federal carbon fuel charge required under the Greenhouse Gas Pollution Pricing Act (Alberta, n.d.).

b. ETS cap setting

The total emissions cap under the TIER Regulation is calculated as the sum of annual emissions limits, which are based on emissions intensity benchmarks for all regulated entities. Since the cap is not set in advance, it is only determined after the compliance period has ended. Facilities can meet their compliance obligations through several options:

- Reducing on-site emissions, including utilising capture recognition tonnes,
- Submitting emission offset credits,

- Submitting emissions performance credits, or
- Purchasing fund credits by paying into the TIER Fund at the established TIER Fund Price.

Additionally, large emitters or opted-in facilities facing economic hardship may be eligible for relief through the Cost Containment Program. The Alberta Emission Offset System allows the creation of Emission Offset Credits, which regulated facilities can use to meet their compliance requirements under the TIER regulation.

c. ETS allowances allocation

Under the TIER Regulation, allocation is determined by annual emissions limits based on emissions intensity benchmarks. Entities that emit less than their assigned limit receive free Emissions Performance Credits (EPCs) from the Government of Alberta, equivalent to the amount of tCO_2e saved. These EPCs function similarly to free allocations in other benchmark-based ETSs and can be banked or sold to entities that exceed their limits. Facilities emitting more than their limit must compensate for each tCO_2e exceeded by a specified deadline.

The TIER Regulation uses two primary benchmarking methods to set emissions reduction targets:

- High-Performance Benchmark (HPB) Approach: Benchmarks are set according to the emissions intensity of the most efficient facilities producing each benchmarked product during reference years. If fewer than ten facilities produce the product, the benchmark is set using the emissions intensity of the best-performing facility. When there are 11 to 20 facilities, the top two will be used to determine the HPB; when there are 21 to 30 facilities, the top three will be used; and so on. If no high-performance benchmark exists for a product, a facility-specific benchmark applies. The formula is as follows (Alberta, 2023):

$$HPB = \frac{EI_{j,k}}{(q)}$$

  - $EI_{j,k}$ The emissions intensity for the product (j) at each top ten percent performing facility (k)
  - q: The number of facilities in the top 10%

- Facility-Specific Benchmark (FSB) Approach: This requires facilities to reduce emissions intensity relative to their historical production-weighted average. However, this approach does not apply to sectors like industrial heat, hydrogen, or electricity.

$$FSB = (FSBtightening_j \; x \; (1 - RTY)) + \; FSBnon - tightening_j$$

  - $FSBtightening_j$: The portion of the facility-specific benchmark for the product (j) that is subject to the reduction target
  - RTY: The reduction target (%)
  - $FSBnon - tightening_j$: The portion of the facility-specific benchmark for the product ($_j$) that is not subject to the reduction target

This regulatory framework provides flexibility while ensuring facilities make progress in reducing their emissions intensity. As with other systems discussed in this report, it balances ambition with

practicality, promoting gradual progress while allowing industries time to adapt. As per 2024, the main price of Alberta TIER allowances is USD 58.9/tCO_2e (World Bank, n.d.).

III.3.7.3. ETS implementation and challenges

All in all, the Alberta TIER provides a cost-effective emission reduction as it covers 62% of the province's GHG emissions. With the involvement of stakeholders and Albertans in its inception, the system intends to meet the needs to balance the environment and the economy (Alberta, n.d.). The system targets EITE sectors in Alberta, encompassing emissions-intensive sectors that are unable to pass on the additional cost to their customers in the international market (Ecofiscal, 2019).

Despite the challenging barrier of having a high economic dependency on EITE sectors (around 18% of provincial GDP), the flexibility and intensity-based approach helps Alberta manage economic disruptions. For instance, the intensity-based approach allows entities to reduce emissions per unit of output, rather than reducing their unit output production. Additionally, the system also allows large emitters or opt-in facilities experiencing economic hardship to request economic relief through the Cost Containment Program (Alberta, n.d.). Moreover, its adoption also brings revenues that are now used for GHG emission reduction programs and low-carbon innovation activities (ICAP, 2024a).

III.4. Considerations for Viet Nam

III.4.1. Key learning points from selected ETSs

The following section provides a comparative overview of the ETS selected as case studies for Viet Nam. It highlights critical design and implementation features, offering valuable insights for developing an effective ETS governance tailored to Viet Nam's context.

III.4.1.1. Comparative overview of selected ETS case-studies

The table below summarises key aspects related to scope & coverage, cap-setting, allowance allocation across the seven selected ETSs, which serves as a foundation for evaluating the diverse approaches adopted by various countries and jurisdictions on design and governance of ETSs.

Table 16: Summary of the key design and governance features from selected international ETS case studies

	Scope & Coverage	Cap setting	Allocation method	Emission coverage	Allowance price 2024 (USD)
EU ETS	**Sector:** Power, industry, aviation, and maritime **GHG-emission sources:** Direct **Type of GHGs:** CO_2, HFCs, N_2O, PFCs, SF_6 **Entities covered:** Installations (energy and industry); companies (aviation and maritime transport) **Number of entities:** 8,640 installations, 390 aircraft operators (2022)	**Cap category:** Absolute cap **Approach to cap-setting**: Top-down **Cap level:** • Phase 1: 2,096 $MtCO_2e$ in 2005 • Phase 2: 2,049 $MtCO_2e$ in 2008 • Phase 3: 1,816 $MtCO_2e$ in 2020 • Phase 4: 1,386 $MtCO_2e$ (2024, electricity and heat generation, industrial manufacturing and maritime transport) 28.9 $MtCO_2e$ (2024, aviation)	• Phase 1: Grandparenting • Phase 2: Hybrid (eight member states adopted auctioning method) Phase 3: Hybrid with auctioning became the main method. Free allocation only used for EITE sectors with benchmarking approach • Phase 4: Hybrid with auctioning became the main method. Free allocation only used for EITE sectors with benchmarking approach	38%	61.3/tCO_2e
South Korea ETS	**Sector:** Power, industry, building, transport, aviation, maritime, waste **GHG emission sources:** Direct **Type of GHGs:** CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	**Cap category:** Absolute cap **Approach to cap-setting:** Top-down **Cap level:** • Phase 1: 585.5 $MtCO_2e$ (2017) • Phase 2: 562.5 $MtCO_2e$ (2020) • Phase 3: 567.1 $MtCO_2e$ (2024)	• Phase 1: Free allocation using benchmarks based on previous • activity data from the base years • Phase 2: Hybrid with free allocation remains as the main method. Free allocation using sector-	74%	6.3/tCO_2e

	Scope & Coverage	Cap setting	Allocation method	Emission coverage	Allowance price 2024 (USD)
	Entities covered: Installations, companies, financial institutions **Number of entities:** • Phase 1: 534 entities • Phase 2: 591 entities • Phase 3: 804 entities		specific benchmarking • Phase 3: Hybrid with free allocation remains as the main method. Free allocation using the combination of sector-specific benchmarking and grandparenting		
China National ETS	**Sector:** Power GHG emission sources: Direct (industry); indirect (electricity and heat consumption) **Type of GHGs:** CO_2 **Entities covered:** Companies **Number of entities:** 2,257 (2021 and 2022)	**Cap category:** Intensity-based cap **Approach to cap-setting:** Bottom-up **Cap level:** • 2019 and 2020: ~4,500 $MtCO_2$ • 2021 and 2022: ~5,000 $MtCO_2$	Free allocation using output-based benchmarking	40%	12.6/tCO_2e
Mexico ETS	**Sector**: Power, industry GHG emission sources: Direct **Type of GHGs:** CO_2 **Entities covered:** Installations **Number of entities:** 295	**Cap category:** Absolute cap **Approach to cap-setting:** Top-down **Cap level:** • 2020: 271.3 $MtCO_2$ • 2021: 273.1 $MtCO_2$	Free allocation using grandparenting approach equivalent to 100% of their most recent verified emissions	40%	-

	Scope & Coverage	Cap setting	Allocation method	Emission coverage	Allowance price 2024 (USD)
Indonesia ETS	**Sector**: Power subsector - coal-fired plants **GHG emission sources:** Indirect **Type of GHGs:** CO_2, CH_4 and N_2O **Entities covered:** Installations **Number of entities** • 2023: 42 entities covering 99 installations • 2024: 63 entities covering 146 installations	**Cap category:** Intensity-based cap **Approach to cap-setting:** Bottom-up **Cap level:** Approx. 238.2 $MtCO_2$ in total • Coal-fired power plants with a capacity of 25 MW) to ≤ 100 MW: 1.3 tCO_2e/MWh • Mine mouth coal-fired power plants with a capacity of ≥ 100 MW: 1.1 tCO_2e/MWh • Non-mine mouth coal-fired power plants with a capacity of 100 MW to ≤ 400 MW: 1.0 tCO_2e/MWh • Non-mine mouth coal-fired power plants with a capacity of > 400 MW: 0.9 tCO_2e/MWh	Free allocation using benchmarking of looking at emissions production for every MWh of electricity generated	81.4% of sector's emissions	0.6/tCO_2e
Canada OBPS	**Sector**: Power, industry GHG emission sources: Direct **Type of GHGs:** CO_2, CH_4, N_2O, SF_6, HFCs, PFCs	**Cap category:** Intensity-based cap **Approach to cap-setting:** Bottom-up **Cap level:**	Free allocation using emissions intensity benchmarks	9%	58.9/tCO_2e

	Scope & Coverage	Cap setting	Allocation method	Emission coverage	Allowance price 2024 (USD)
	Entities covered: Facilities **Number of entities:** 37 facilities (14 mandatory and 23 voluntary facilities)	No explicit emissions cap			
Alberta TIER	**Sector**: Power, industry GHG emission sources: Direct **Type of GHGs:** CO_2, CH_4, N_2O, SF_6, HFCs, PFCs **Entities covered:** Facilities Number of entities: 455	**Cap category:** Intensity-based cap **Approach to cap-setting:** Bottom-up **Cap level:** 160 $MtCO_2e$ (2022)	Free allocation using emissions intensity benchmarks	62%	58.9/tCO_2e

Source: Compiled by the Consultant

In general, economic-environmental trade-offs, transition management, and risk mitigation such as carbon leakage have become common themes in selected ETSs' design. In determining the scope and coverage, mature ETSs such as the EU, South Korea, Canada, and Alberta started with limited sectors and GHGs before progressively expanding over time. The relatively new ETSs of Mexico and Indonesia then followed their footsteps by focusing on high-emitting sectors first before planning to expand in their next phase of development.

Regarding the cap setting, the adoption of absolute cap and intensity-based is mixed. The former was adopted by EU ETS, South Korea, and Mexico, which set a specific emission reduction target for covered sectors. On the other hand, the remainder preferred an intensity-based approach in setting up the cap for their system. Nonetheless, whether the government chooses to adopt an absolute or intensity-based approach, considerations for economic conditions need to be factored in to ensure a level playing field between regulated and non-regulated entities. Most ETSs also conduct periodic revision of the cap to ensure its alignment with their national climate targets. The EU ETS demonstrates how a clear long-term cap trajectory can support effective market operation and build confidence among market participants. Additionally, a well-defined trajectory signals to industries that the ETS will remain a long-term policy instrument, ensuring continuity in carbon pricing and emission reduction efforts and that there is no alternative to the ETS as the most effective carbon pricing instrument.

Lastly, the allowance distribution approach is mostly driven by carbon leakage considerations. In the EU ETS, despite using auctioning as the primary method of distribution, allowances are still freely allocated to specific sectors that are vulnerable to carbon leakage. For South Korea, free allocation is adopted for EITE sectors and several non-EITE sectors, but the country plans to reduce and replace it with auctioning over time. On the other hand, the more recent ETSs such as Mexico and Indonesia use the free allocation method as a way to attract participants into the system and reduce economic disruptions. Similarly, Canada and Alberta are adopting free allocation to balance ambition with practicality, promoting gradual progress while allowing industries time to adapt.

III.4.1.2. Lessons learnt from the ETSs implementation

As the longest-running ETS, the EU ETS showcases a well-defined and well-executed approach throughout its various phases. Additionally, the system's flexibility is evident in its responses to market challenges. For example, the early stages of the EU ETS were characterised by an oversupply of allowances due to overestimated emissions calculation, which resulted in low carbon prices. To address this oversupply, the EU implemented the Market Stability Reserve and adopted a more aggressive cap reduction rate, demonstrating both market flexibility and the importance of robust price signals.

Meanwhile, Canada and the state of Alberta's ETSs offer significant lessons in obtaining industry support or consent for the ETS policy, in spite of the economic reliance on EITE sectors. Their flexible intensity-based approaches effectively navigate these challenges and concerns around competitiveness and profitability while needing to fulfil national climate objectives. Yet, Mexico and Indonesia, as newer ETSs are still struggling despite trying to implement a flexible and gradual transition. Both systems seek to ensure industry support for the ETS by adopting free allocation and prioritisation of highest-emitting sectors. However, these approaches instead led to a struggle

to establish prices for Mexico and low market activity for Indonesia. In Mexico, the principle of avoiding economic cost in the pilot phase is resulting in almost all transactions happening with no cash involvement and therefore resulting in a challenge to establish a carbon price. On the other hand, Indonesia's prioritisation of the highest-emitting sectors has led to a limited number of covered sectors and players, resulting in a low market activity of the trading platform, Indonesia Carbon Exchange.

III.4.2. Recommendations and considerations for Viet Nam's ETS design and implementation based on international experiences

The preceding overview and analysis of the seven ETSs worldwide provided valuable insights into different governance approaches, highlighting best practices and potential pitfalls in three critical areas: Scope & coverage, cap-setting and allowance allocation. Drawing from these lessons, the recommendations and considerations for Viet Nam to develop a robust and effective governance of the ETS are as follows:

III.4.2.1. ETS scope & coverage

As for the sectoral coverage, based on the experiences of all of the ETS case studies, Viet Nam should prioritise targeting the highest-emitting sectors and their key GHGs as the initial focus of its ETS. This phased approach ensures that the system captures the most significant sources of emissions from the outset, maximising its environmental impact while maintaining administrative feasibility.

The case studies show that early-stage ETSs usually concentrate on sectors with large, stationary emissions sources such as power generation, heavy industry and high-emitting manufacturing processes. These sectors not only contribute substantially to the national GHG emissions but also tend to have better MRV systems in place, facilitating smoother ETS implementation. By focusing on these sectors first, Viet Nam can build a solid foundation for its ETS, ensuring compliance, price stability, and overall system credibility.

Moreover, limiting the initial scope allows regulators and market participants to build capacity and gain experience before broadening the system to additional sectors. Over time, once the ETS infrastructure is well established and stakeholders have adapted, Viet Nam can gradually expand its coverage to include other industries and emission sources. This approach aligns with global best practices, like the EU ETS and China National ETS.

Meanwhile, as the ultimate goal of an ETS is to provide a flexible mechanism for GHG emission reductions, Viet Nam should make the decisions on the sectoral coverage for the pilot phase based on analysis of the national GHG inventory as well as considerations of its GHG emission reduction targets in the NDC.

In addition, Viet Nam's ETS design should also take into consideration international carbon pricing trends, particularly the EU's CBAM. CBAM imposes a carbon price on certain imports, including steel, cement, aluminium, and fertilisers, based on their embedded emissions. By ensuring that these high-emission industries are covered by the ETS and priced at levels comparable to international benchmarks, Viet Nam can mitigate trade risks and ensure continued access to global markets.

Similarly, the GHGs coverage, level of reporting obligation and points of regulations for the ETS should be defined to ensure balance environmental effectiveness, administrative feasibility, and alignment with national GHG emission profiles, national GHG emission reduction targets, and international and domestic carbon pricing policies. For example, in the case of the Mexico national ETS, the national ETS needs to take into account various existing and planned state-level carbon taxes as well as the national carbon tax in terms of the sectors and gases covered, and decide the approach for the national ETS.

Viet Nam may also consider setting an inclusion threshold for the ETS to cover only the largest emitters. Systems, like the EU ETS, China national ETS, South Korea ETS, have set their initial thresholds at approximately 25,000 tCO_2/year per facility. This approach ensures that the ETS captures the majority of the national GHG emissions while minimising administrative complexity and avoiding excessive burden on small- and medium-sized enterprises (SMEs).

III.4.2.2. ETS cap setting

Setting an effective emission cap is a critical element of a well-functioning ETS. The selected case studies show that a clear, gradually tightening cap trajectory is essential to drive emissions reductions while ensuring economic stability.

A science-based, top-down approach should be adopted in the initial stage to ensure the ETS cap is consistent with Viet Nam's NDC targets, sectoral mitigation plans, and long-term net-zero commitments. This approach guarantees that the ETS cap is consistent with broader climate policies while allowing the ETS to operate even if facility-level emission data is incomplete.

Later on, as data collection and MRV systems improve, the ETS should gradually incorporate bottom-up elements, integrating installation-level emissions data, production/output metrics, and sector-specific performance benchmarks to refine the cap-setting process.

Viet Nam may consider following China's phased approach by starting with an intensity-based cap and transitioning to an absolute cap over time. This strategy provides flexibility for high-growth sectors, allowing room for economic development while improving carbon efficiency.

Additionally, flexibility provisions should be catered for to allow for periodic review and adjustment of the cap to avoid oversupply of allowances, low carbon prices and low market activity. To ensure that the ETS is effective in reducing GHG emissions, tightening the ETS cap is important. Viet Nam can look into adopting a linear reduction factor, i.e. the annual reduction rate of the cap on GHG emissions at a later stage, as what the EU ETS has done in 2023.

III.4.2.3. ETS allowances allocation

Viet Nam needs to balance between the mitigation objective and economic competitiveness when designing the ETS policy on allowance allocation. An ETS without regard for economic competitiveness poses a risk of carbon leakage and economic decline, while free allocation without regard for carbon efficiency would not drive decarbonisation and achieve the NDC.

Carbon leakage refers to the situation whereby companies eventually relocate their production activities to another country with a lower or no carbon price, leading to no overall decrease, or an increase in emissions of the production activity itself. Secondly, prior to such relocation events,

the ETS also reduces the overall competitiveness of the industries in relation to other industry peers operating in other jurisdictions.

To address these risks, the government of Viet Nam should consider adopting a free allowance allocation approach - with caveats - because over-reliance on free allowances simply does not work out and would eventually erode the carbon price signal and lead to low prices, disincentivising low-carbon innovation and the trading of allowances among companies. It is also pertinent that the government identifies and prioritises both the sectors and companies that are at risk of carbon leakage, as not all sectors and companies covered by the ETS face the same risk of carbon leakage. The sectors that face the highest risk of carbon leakage should receive the highest share of free allocation. The sectors that do not have the highest risk of carbon leakage could have their share of free allocations gradually decreasing over time.

One key consideration is that emissions intensity-based benchmarks should be set for 'hard to abate' sectors such as steel and cement to determine the allocation of free allowances. These benchmarks should specifically apply to industrial process and product use (IPPU) emissions, which are inherent to the manufacturing process.

However, since technological advancements can make some IPPU emissions easier to abate over time, these benchmarks should be regularly reviewed and adjusted to encourage continuous improvements in the decarbonisation pathway.

III.4.2.4. Other considerations

Viet Nam should consider balancing flexibility in the early stage with a clear progression towards a more stringent system over time. Drawing lessons from the EU ETS, a roadmap should be established from the outset to guide the gradual expansion of scope and coverage, tightening of the emission cap, and progressive transition from free allocation to auction-based allocation of allowances. The EU's phased approach, outlined in its initial directive, has enabled it to stay on track for its 2030 target of 62% emission reduction compared to 2005 levels while generating over EUR 200 billion in public revenue from auctioning since 2013.

Other considerations for the design and implementation of Viet Nam's ETS:

a. Managing ETS risks: Stranded assets and incentives for early action

Viet Nam should also anticipate the risks associated with ETS cap setting and allowance allocation, particularly in cost and value distribution. One key challenge is stranded assets – high-emission assets such as coal mines and coal-fired power plants that were once profitable but become financially unviable under carbon pricing. As seen in other ETSs, free allocation through grandfathering can partially compensate for these losses, but excessive reliance on this approach risks windfall profits for emitters.

Additionally, a poorly designed grandfathering system can create perverse incentives, where entities artificially inflate emissions before the ETS takes effect to secure more free allowances. This discourages early emissions reduction efforts and delays decarbonisation. To mitigate this risk, Viet Nam should consider a hybrid approach, using an early historical emissions reference date for grandfathering while integrating benchmarking from the outset. This would reward early action and prevent emissions inflation strategies.

Ultimately, every ETS creates winners and losers depending on the policy design. A balanced allocation mechanism – combining grandfathering for sectors with high exposure to carbon pricing risks and benchmarking to encourage efficiency – will be crucial for Viet Nam's transition.

b. Beyond core ETS elements: Banking and offsetting rules

In addition to scope & coverage, cap setting, and allowance allocation, Viet Nam should carefully design its banking and offsetting mechanisms to avoid unintended market distortions. Unrestricted banking has led to market liquidity issues in South Korea ETS, while lenient offsetting rules have caused allowance oversupply in the EU ETS and China National ETS. Viet Nam must strike a balance between providing compliance flexibility and ensuring that these mechanisms do not undermine emissions reductions.

A well-planned ETS implementation strategy is essential to managing market transitions and minimising disruptions. As demonstrated in international ETSs such as the EU ETS and South Korea ETS, having a clear, phased roadmap enhances market confidence and ensures a gradual yet effective transition towards a robust carbon pricing mechanism.

IV. ANALYSIS OF EXISTING LEGAL FRAMEWORK FOR DEVELOPMENT OF THE ETS GOVERNANCE OPTIONS IN VIET NAM

Viet Nam has identified the development of an ETS as a key instrument for achieving its GHG reduction commitments. Under the current roadmap, Viet Nam plans to pilot the ETS from June 2025, with full implementation starting in 2029 (The Prime Minister, 2025).

To ensure the effective operation of the ETS, a well-defined legal and regulatory framework is crucial, particularly for core design elements, including scope & coverage, cap-setting, and allowance allocation. These elements play a vital role in establishing a transparent, efficient, and market-driven system.

Currently, the regulatory framework governing key ETS design elements in Viet Nam is mainly governed in LEP 2020 and related regulations under LEP 2020 framework, including:

1. Decree No. 06/2022/ND-CP, dated 07 January 2022, issued by the Government, on regulations on greenhouse gas emission reduction and ozone layer protection (Decree No. 06/2022/ND-CP). This Decree is currently under revision to provide clearer provisions on ETS implementation. The latest draft amendment was released for public consultation on 5 December 2024.
2. Decision No. 13/2024/QD-TTg dated 13 August 2024 issued by the Prime Minister promulgating the list of sectors, GHG emitting establishments subject to GHG inventory (updated version) (Decision No. 13/2024/QD-TTg)
3. Decision No. 232/QD-Ttg dated 24 January 2025, issued by the Prime Minister on approval of the proposal for the establishment and development of the carbon market in Viet Nam (Decision No. 232/QD-Ttg)

The following sub-sections analyse key ETS design aspects within existing legal and regulatory framework, along with relevant provisions under consideration in the draft amended Decree No. 06/2022/ND-CP. This analysis aims to provide a clear understanding of the current regulatory framework for the core design elements of Viet Nam's ETS. From there, it will be compared with international case studies to identify areas for further development and explore effective governance options for Viet Nam's ETS.

IV.1. Regulations related to scope & coverage

IV.1.1. Sectoral coverage in ETS

Under the LEP 2020, Decree No. 06/2022/ND-CP and Decision No. 232/2025/QD-Ttg, the regulated entities to participate in the ETS include facilities identified in the list of sectors and facilities subject to GHG inventory as specified by the Prime Minister. The list is updated biannually, taking into account factors such as GHG emission levels, socio-economic development conditions, and fuel and energy consumption per unit of product or service. To date, two decisions have been issued in 2022 and 2024, with the most recent being Decision No. 13/2024/QD-TTg.

Under Decision 13/2024/QD-Ttg, sectors subject to GHG inventory are categorised based on IPCC approach to national GHG inventory, which include: (i) Energy; (ii) Transportation; (iii) Construction;

(iv) Industrial Processes (IP); (v) Agriculture, Forestry, and Land Use (AFOLU); (vi) Waste. The detailed list is shown in Table below:

Table 17: Sectors required to conduct GHG inventory under Decision No. 13/2024/QD-Ttg

No.	Sectors required to conduct GHG inventory
I	**Energy**
1	Energy production industry
2	Energy consumption in industry, commerce, services, and residential sectors
3	Coal mining
4	Oil and natural gas extraction
II	**Transportation**
1	Energy consumption in transportation
III	**Construction**
1	Energy consumption in the construction industry
2	Industrial processes in building materials production
IV	**Industrial Processes (IP)**
1	Chemical production
2	Metallurgy
3	Electronics industry
4	Use of products substituting ozone-depleting substances
5	Production and use of other industrial products
V	**Agriculture, Forestry, and Land Use (AFOLU)**
1	Livestock
2	Forestry and land-use change
3	Cropping
4	Energy consumption in agriculture, forestry, and fisheries
5	Other emission sources in agriculture
VI	**Waste**
1	Solid waste landfills
2	Biological treatment of solid waste
3	Waste incineration and open burning
4	Wastewater treatment and discharge

Source: The Prime Minister, 2024

For the list of facilities subject to GHG inventory, the facilities are categorised based on economic management sectors. There is total of 2,166 facilities divided into four sectors: (i) industry and trade; (ii) transportation; (iii) construction; and (iv) natural resources and environment.

This approach enables a phased expansion of the scope and coverage of Viet Nam's ETS over time. According to the roadmap for carbon market implementation in Viet Nam outlined in Decision 232/QD-TTg, the ETS will undergo a pilot phase from 2025 to 2028, during which it will apply to GHG-emitting facilities in selected emission-intensive sectors. From 2029, with the transition to the official implementation phase, the sectors and facilities covered by the ETS will be subject to review and expansion in accordance with an established roadmap.

The draft amended Decree No. 06/2022/ND-CP is currently proposing that thermal power-, ion and steel-, and cement- production facilities will be covered for the pilot phase.

IV.1.2. Gas coverage

LEP 2020 identifies three primary GHGs, including CO_2, CH_4 and N_2O. In addition, four GHGs with low concentrations but high global warming potential, which are HFCs, PFCs, SF_6 and NF_3, are also covered.

Decree No. 06/2022/ND-CP specifically mandates GHG inventory reporting requirements. Accordingly, Ministry of Agriculture and Rural Development (MARD), Ministry of Transport (MOT), and MONRE are required to conduct GHG inventories and report emissions of CO_2, CH_4, and N_2O within their respective sectors. On the other hand, Ministry of Industry and Trade (MOIT) and Ministry of Construction (MOC) shall include HFCs in their inventory reporting alongside these primary GHGs.

IV.1.3. Level of reporting obligation

In scope design, the level of reporting obligation is generally divided into two options: (i) Installation: a specific entity with direct operational control over the installation with a well-defined physical boundary that produces the emission; and (ii) Company: a specific entity with financial control over several installations under its corporate structure.

According to Decision 13/2024/QD-TTg, facilities included in the GHG inventory list are identified based on well-defined boundaries and tonnes of oil equivalent (TOE) that meet the established regulatory thresholds. Thus, the reporting obligation is set at the installation level.

IV.1.4. The point of regulation

Current ETS regulations in Viet Nam have not yet defined the point of regulation.

However, the draft amended Decree No. 06/2022/ND-CP is considering this aspect. It proposes that the average GHG emissions per unit of product be determined based on direct GHG emissions per unit of output, therefore, considering covering direct emissions (Scope 1).

Additionally, for activities scope, the draft Decree is also considering major GHG-emitting activities at the facility level, including electricity generation (kWh) for thermal power plants, crude steel production (tons) for steel manufacturing facilities, and clinker production (tonnes) for cement plants.

IV.1.5. Thresholds

Decree No. 06/2022/ND-CP sets thresholds to identify and determine which facilities are required to conduct GHG inventories, which may also be potentially subject to inclusion in the ETS.

Accordingly, facilities required to conduct GHG inventories include those with annual GHG emissions of 3,000 tCO_2e or more or those meeting one of the following criteria:

1. Thermal power plants and industrial production facilities with an annual energy consumption of 1,000 TOE or more.
2. Freight transport companies with an annual fuel consumption of 1,000 TOE or more.
3. Commercial buildings with an annual energy consumption of 1,000 TOE or more.

4. Solid waste treatment facilities with an annual operating capacity of 65,000 tonnes or more.

IV.2. Regulations related to cap-setting

LEP 2020 stipulates that the allocation of allowances should be is based on (i) national strategy on climate change and relevant strategies and plans; (ii) results of GHG inventory at national-, sector, and facility- level; and (iii) roadmap and modalities for GHG emission reductions that are compatible with national conditions and international commitments of Viet Nam.

Additionally, cap-setting is further regulated under Article 12 of Decree No. 06/2022/ND-CP. This Decree mandates that, based on the GHG emission reduction targets and implementation roadmap, and the most recent GHG inventory results from facilities, MONRE will propose total GHG emission allowances for the 2026–2030 period, along with an annual allowance allocation plan, to the Prime Minister for approval.

However, the existing regulatory framework does not clearly specify the methodology for cap-setting, leaving it unclear whether a bottom-up or top-down approach will be adopted.

IV.3. Regulations related to allowance allocation

Currently, the methodology for allowance allocation remains undefined in existing regulations

However, the draft amended Decree No. 06/2022/ND-CP introduces additional provisions on allowance allocation, which proposed a phased approach as follows:

1. For the phase 2025 - 2026:

- Entities allocated GHG emission allowances include thermal power plants, steel production facilities, and cement production facilities, as listed in the GHG inventory issued by the Prime Minister.
- MOIT shall propose the allocation of allowances for 2025 and 2026 for each thermal power plant and steel production facility and submit it to MONRE by 30 June 2025.
- MOC shall propose the allocation of allowances for 2025 and 2026 for each cement production facility and submit it to MONRE by 30 June 2025.
- MONRE, in coordination with relevant ministries and agencies, shall review, assess, and compile a report for submission to the Prime Minister for approval of the total GHG emission allowances, along with a list of facilities proposed for allocation. Based on the approved total allowances, MONRE shall allocate allowances to facilities by 31 December 2025.

2. For Phase 2027 – 2028 and Phase 2029 – 2030:

- Sectoral management ministries shall propose a list of facilities eligible for allowance allocation, based on the GHG inventory list issued by the Prime Minister, along with the annual allocation amount for each facility. The proposals must be submitted to MONRE by 30 June 2027, for phase 2027 – 2028, and by 30 June 2029, for Phase 2029 – 2030.
- MOIT and MOC shall update the list of eligible facilities and the annual allocation amount for thermal power plants, steel production facilities, and cement production facilities.

These updates must be submitted to MONRE by 30 June 2027, for phase 2027 – 2028, and by 30 June 2029, for phase 2029 – 2030.

- MONRE, in coordination with relevant ministries and agencies, shall review, assess, and compile a report for submission to the Prime Minister for approval of the total GHG emission allowances and the list of facilities proposed for allocation for phase 2027 – 2028 and phase 2029 – 2030. Based on the approved total allowances, MONRE shall allocate allowances to facilities by 31 October 2027 for phase 2027 – 2028, and by 31 October 2029, for phase 2029 – 2030.

Additionally, the draft amended Decree No. 06/2022/ND-CP includes detailed annexes outlining the allowance allocation following benchmark-based allocation method. Under this approach, the average GHG emissions per unit of production are determined based on direct emissions per unit of output, including:

- KWh of electricity for thermal power plants,
- Tonnes of crude steel for steel production facilities,
- Tonnes of clinker for cement production facilities.

Accordingly, the GHG emission allowance allocated to a facility is calculated using the following formula:

$$A_{a,y} = P_{a,(y-1;y-2;y-3)} \times B$$

Where:

- $A_{a,y}$: GHG emission allowance allocated to facility a in year y (tCO_2e).
- $P_{a,(y-1;y-2;y-3)}$: Average production output of facility a over three years y-1, y-2, y-3 (e.g., kWh for thermal power plants, tonnes of crude steel for steel production facilities, tonnes of clinker for cement production facilities).
- B: Average GHG emissions per unit of production for facilities of the same type (facility 1 to facility n), which are allocated allowances (tCO_2e per unit of product), determined using the following formula:

$$B = \frac{\sum_1^n \quad E_{(y-1;y-2;y-3)} \times (100\% - T)}{\sum_1^n \quad P_{(y-1;y-2;y-3)}}$$

Where:

- $E_{(y-1;y-2;y-3)} E_{(y-1;y-2;y-3)}$: Average emissions of the facility over the past three years y-1, y-2, y-3 (tCO_2e).
- T: GHG emission reduction target for year y for facilities of the same type (%)

Thus, under the approach outlined in the draft amended Decree No. 06/2022/ND-CP, allowance allocation for thermal power plants, cement, and steel production will be based on the fixed historical benchmarking method.

IV.4. Summary of national regulations related to key ETS design aspects

Based on the analysis of national regulations related to ETS design aspects, the table below summarises the key regulatory provisions governing Viet Nam's ETS.

Table 18: ETS design aspects regulated in the existing regulations in Viet Nam

ETS design aspects	Viet Nam's ETS
Scope & Coverage	
Sectoral coverage	Facilities in the sectors covered in ETS: i) industry and trade; ii) transportation; iii) construction; and iv) natural resources and environment. Consideration in the draft amended Decree No. 06/2022/ND-CP: For the period 2025 – 2026, ETS will be piloted for the thermal power, cement, and steel sectors
Gases	• CO_2 • CH_4 • N_2O • HFCs (only for the energy and industrial processes sectors under the management of MOIT and construction sector under the management of MOC)
Level of reporting obligation	Installation level
Point of regulation	This is not regulated in existing regulations. Consideration in the draft amended Decree No. 06/2022/ND-CP: • Emission sources: Direct emissions • Activities scopes: Major GHG-emitting activities at the facility level, including electricity generation for thermal power plants, crude steel production for steel manufacturing facilities, and clinker production for cement plants.
Thresholds	Facilities required to conduct GHG inventories include those with annual GHG emissions of 3,000 tCO2e or more or those meeting one of the following criteria: • Thermal power plants and industrial production facilities with an annual energy consumption of 1,000 TOE or more. • Freight transport companies with an annual fuel consumption of 1,000 TOE or more. • Commercial buildings with an annual energy consumption of 1,000 TOE or more. • Solid waste treatment facilities with an annual operating capacity of 65,000 tonnes or more.

ETS design aspects	Viet Nam's ETS
	These will be allocated with allowances and eligible to participate in the domestic carbon market in accordance with a phased approach.
Cap-setting	Whether a bottom-up or top-down approach will be adopted remains unclear in existing regulations.
Allowances allocation	This is not regulated in the existing. Consideration in the draft amended Decree No. 06/2022/ND-CP: Allowance allocation will follow fixed historical benchmarking method.

V. KEY DESIGN AND GOVERNANCE GAPS FOR THE DEVELOPMENT OF ETS IN VIET NAM

Based on the review of international ETS case studies and the analysis of national regulations on ETS development, this section compares Viet Nam's existing conditions, as derived from an in-depth analysis of the national legal framework, with common features of selected international ETS case studies in the previous section. The analysis focuses on the key design elements, including scope & coverage, cap-setting, and allowance allocation. Particular attention is given to aspects that are not well-defined in existing regulations.

The Table below presents a comparative analysis of international best practices and Viet Nam's current ETS regulations, highlighting key gaps in the system's design and governance.

Table 19: Gaps related to ETS design aspects in Viet Nam

No.	Key ETS design aspects	International experience	Existing regulations	Gaps
I	**Scope & coverage**			
1	Scope	International case studies reveal that in the early phases, many ETSs concentrate on high-emission, energy-intensive sectors before expanding their coverage. This approach is strategic for two key reasons: these sectors contribute significantly to national GHG emissions and typically have more robust MRV systems, which facilitate smoother ETS implementation. For instance, the EU ETS Phase 1 (2005–2007) initially targeted power generation and energy-intensive sectors before broadening its scope, while China's National ETS began by covering the power sector - including combined heat and captive power plants.	According to Viet Nam's existing regulations, the ETS will cover energy, transportation, construction, IP, and waste.	Under the current regulations, Viet Nam has not yet officially determined the sectors covered in the pilot phase of the ETS. The draft amended Decree No. 06/2022/ND-CP considers thermal power, cement, and steel for the pilot phase. However, this amendment has not yet been enacted, and the rationale for selecting these sectors has not been clearly articulated, leaving uncertainty in sectoral coverage of the ETS,

No.	Key ETS design aspects	International experience	Existing regulations	Gaps
2	The point of regulations	Currently, the point of regulation varies across case studies and international experiences. For example, the EU ETS covers Scope 1 emissions from over 10,000 installations, whereas the South Korea ETS covers both direct emissions (Scope 1) and indirect emissions from electricity consumption (Scope 2).	This has not been regulated in existing regulations.	Under the current regulations, Viet Nam has not yet officially determined the point of regulation for the ETS. The draft amendment to Decree No. 06/2022/ND-CP is considering covering direct emissions (Scope 1) and major GHG-emitting activities at the facility level, including electricity generation for thermal power plants, crude steel production for steel manufacturing facilities, and clinker production for cement plants. This is still subject to final approval.
II	Cap-setting	Most international ETSs adopt a top-down approach to cap-setting. EU ETS and South Korea ETS, both mature systems, use a top-down cap-setting approach.	There are currently no regulations or guidance on the approach for cap-setting.	The approach for cap-setting remains undefined, requiring further guidance/regulations.

No.	Key ETS design aspects	International experience	Existing regulations	Gaps
III	Allowance allocation	In the early phases, most ETSs apply free allocation, but the method varies. EU ETS phase 1 applies free allocation based on grandfathering. South Korea ETS applies free allocation based on benchmarking. Besides, in the National China ETS, for the power sector, it applies free allocation using output-based benchmarking.	Current regulations do not specify an explicit allowance allocation approach.	The approach for allowance allocation in Viet Nam's ETS is unclear in the current regulations. The draft amended Decree 06/2022/ND-CP is considering the fixed historical benchmarking approach for allocation. However, this amendment has not yet been enacted and the considerations of adjustment factors such as target emission reductions; business plan; emission reduction potential; technical, financial and technology capacity of the facility for emission reductions have not yet been reflected in the proposed approach.

The table highlights several key gaps in the design and governance of Viet Nam's ETS compared to international best practices.

In terms of scope & coverage, while the regulations identify broad sectors for inclusion, such as energy, transportation, construction, IP, and waste, the specific sectors covered in the pilot phase remain undetermined. International ETSs, such as the EU ETS and China National ETS, began by targeting high-emission, energy-intensive sectors before expanding their coverage. Although the draft amended Decree No. 06/2022/ND-CP considers thermal power, cement, and steel for the pilot phase, this has yet to be officially confirmed, and the rationale for selecting these sectors has not been clearly articulated. Additionally, the point of regulation – which type of emissions and activities boundary are to be covered in the Viet Nam's ETS – remains undefined although the draft amended Decree No. 06/2022/ND-CP suggests covering direct emissions (Scope 1) from major emitting activities (electricity generation, crude steel production, and clinker production) in the three sectors.

Regarding cap-setting, the regulatory framework lacks clear guidance on whether a top-down or bottom-up approach will be used. Most international ETSs, including the EU ETS and South Korea ETS, follow a top-down cap-setting methodology to align emissions limits with national climate targets. Viet Nam's ETS would benefit from establishing a clear cap-setting methodology to provide regulatory certainty.

The existing regulations do not provide a clear approach to the allocation of allowances, leaving the specific methods, whether based on grandfathering, benchmarking (fixed historical or output-based) or auctioning, undefined. International experiences demonstrate a variety of methods: grandfathering in the EU ETS Phase 1, benchmarking in the South Korea ETS, and output-based benchmarking in the China National ETS (for the power sector). While the draft amended Decree No. 06/2022/ND-CP considers fixed historical benchmarking, this remains subject to final approval. In addition, the considerations of adjustment factors such as target emission reductions; business plan; emission reduction potential; technical, financial and technology capacity of the facility for emission reductions have not yet been reflected in the proposed approach, creating uncertainty for market participants.

These gaps indicate a need for further regulatory clarification and strategic planning to ensure Viet Nam's ETS follows international best practices while being tailored to the country's economic and emissions profile. To address these gaps effectively, Viet Nam should prioritise the implementation of a well-structured pilot phase before transitioning to full-scale ETS operation. A pilot phase will allow policymakers to test key design elements, refine MRV systems, and assess the feasibility of different scope & coverage, cap-setting and allowance allocation approaches. Given the uncertainties and lack of clarity surrounding these elements, the following section discusses different design and governance options for ETS operation in Viet Nam, with a focus on the pilot phase.

VI. DESIGN AND GOVERNANCE OPTIONS FOR ETS PILOT OPERATION IN VIET NAM

Based on the gap analysis above, this section discusses key design and governance options for the ETS in Viet Nam on the following aspects: (i) Scope & coverage; (ii) Cap-setting; and (iii) Allowance allocation, for the pilot operation period from 2025-2028 as per the latest regulations. Options for each of these aspects are detailed further in sub-sections below.

VI.1. Options for scope & coverage

VI.1.1. Options for sectoral coverage

As highlighted in the previous section, while the draft amended Decree No. 06/2022/ND-CP proposes including the cement, steel, and thermal power sectors in the ETS pilot phase, the rationale behind selecting these sectors is not explicitly detailed. In light of this, and in support of the government's ongoing revisions, this section seeks to both validate the proposed direction and provide additional recommendations. Specially, our calculations and analysis aim to identify sectors suitable for inclusion in the pilot phase of the ETS and provide further recommendations for sectoral coverage under the draft amended Decree No. 06/2022/ND-CP, including emissions scope and points of regulation. This analysis aims to provide clear evidence-based justifications to enhance the coherence, operationalisation and effectiveness of Viet Nam's ETS implementation.

VI.1.1.1. Approach for identifying options for sectoral coverage

To identify options for sectoral coverage under the ETS pilot phase, two key factors are considered:

i. GHG emissions intensity, i.e. the contribution of a sector to national emissions, often measured in absolute emissions or emissions per unit of output;
ii. Trade exposure, i.e. the degree to which a sector competes in international markets and is vulnerable to carbon pricing impacts.

The balanced approach between climate impacts and trade vulnerability is important to define the sectoral coverage of an ETS since it ensures that major emitters are regulated effectively while minimising economic disruptions and carbon leakage risks. The general approach to defining sectoral coverage based on international experiences from existing ETSs is elaborated in the following Figure:

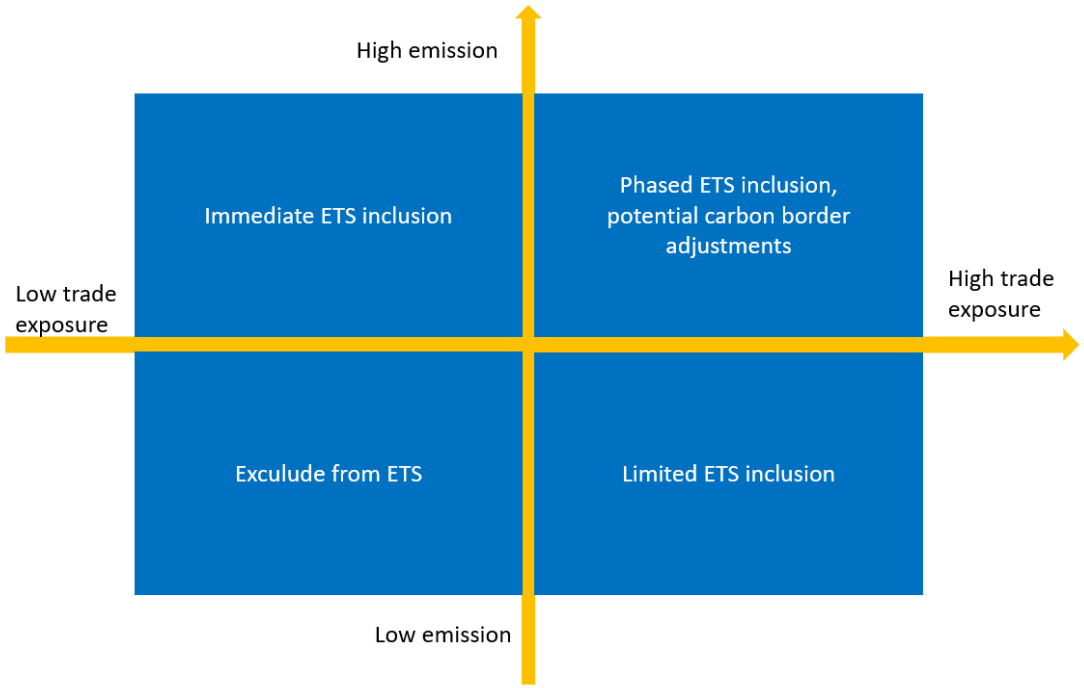

Figure 9: Emissions- and trade-based approach to define ETS sectoral coverage

Source: Consultant elaborated based on international experiences

An ETS should target bringing down emissions from high-emission sectors. However, different strategies should be adopted for sectors with different trade exposure potential:

(i) High emission intensity, low trade exposure

Sectors with high emission intensity and low exposure to international competition are often the first to be included in an ETS because they significantly contribute to national GHG emissions and have a limited risk of carbon leakage. Capturing these sectors would help to maximise the environmental impact while not posing a significant impact on their competitiveness.

(ii) High emission intensity, high trade exposure

Sectors with both high emission intensity and high trade exposure pose challenges for ETS design. While their emissions make them significant contributors to climate change, imposing carbon costs without protection would lead to carbon leakage, reducing the effectiveness of the ETS and harming the economy. Therefore, these sectors should be gradually included in the ETS with consideration of maintaining their competitiveness in the market.

VI.1.1.2. Calculation of emission intensity and trade exposure

Building on the approach outlined above, the Consultant estimates emission intensity and trade exposure for sectors classified under Viet Nam Standard Industrial Classification (VSIC) as regulated in Decision No. 27/2018/QD-TTg, issued by the Government on 6 July 2018, promulgating Viet Nam's standard industrial classification (Decision No. 27/2018/QD-TTg). This system categorises different economic sectors, enabling businesses and regulatory agencies to efficiently identify, manage, and monitor business activities within specific industries.

According to Decision No. 27/2018/QD-TTg, VSIC is organised into a hierarchical structure of sectors, classified into five levels, where level 1 has the broadest scope, while level 5 is more specific and narrowly defined.

The estimation relies on 2020 data, as calculating emission intensity requires GHG inventory information. Currently, Viet Nam only has a draft of the 2020 GHG inventory conducted by MONRE.

The Consultant conducted a GHG inventory assessment for sectors in the VSIC list to identify the highest-emitting sectors within this classification. Based on the latest national GHG inventory report for 2020 (draft version) developed by MONRE, the Consultant conducted a GHG inventory for sectors in level 1 of the VSIC. The result of the GHG inventory by sectors (level 1) is shown in Figure below:

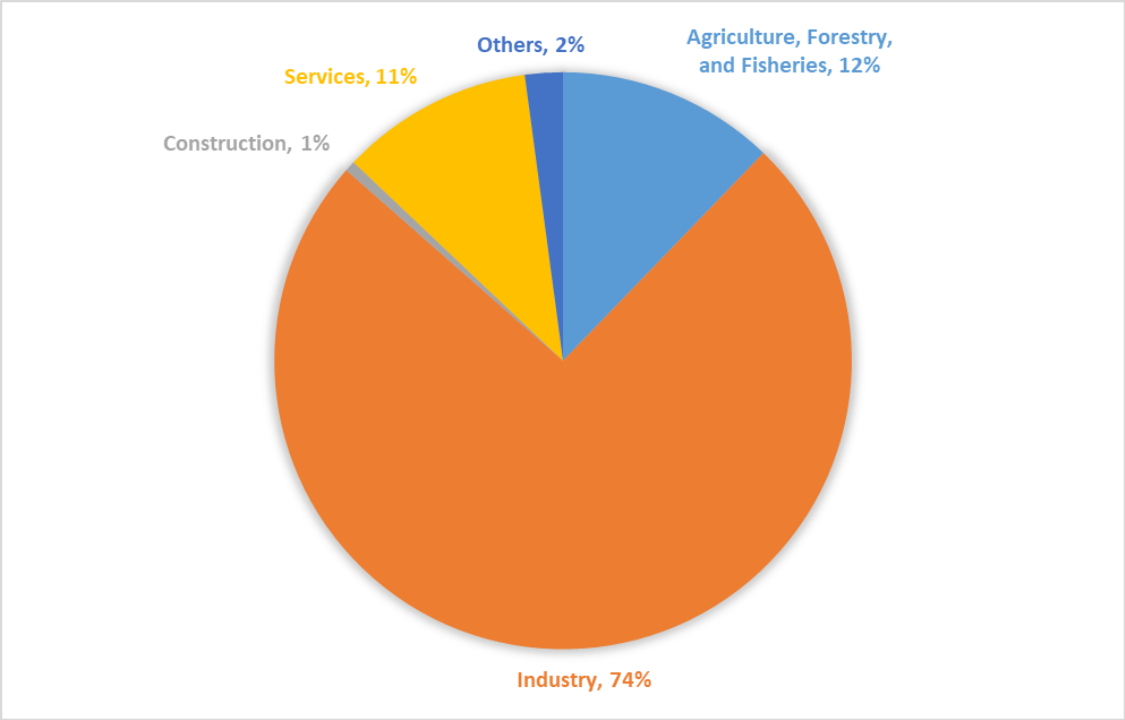

Figure 10: GHG inventory by sectors in 2020

Source: The Consultant

The result indicates that GHG emissions from the industrial sector – comprising B (Mining), C (Manufacturing), D (Electricity, gas, steam, and air conditioning supply), and E (Waste and wastewater management and treatment) – account for over 70% of total national emissions.

Under sectors B, C, D, and E, the Consultant further conducted a GHG inventory for the level-2 sub-sectors to pinpoint those industries with significant emissions for the ETS pilot phase. The GHG inventory results for these sectors are presented in Figure below:

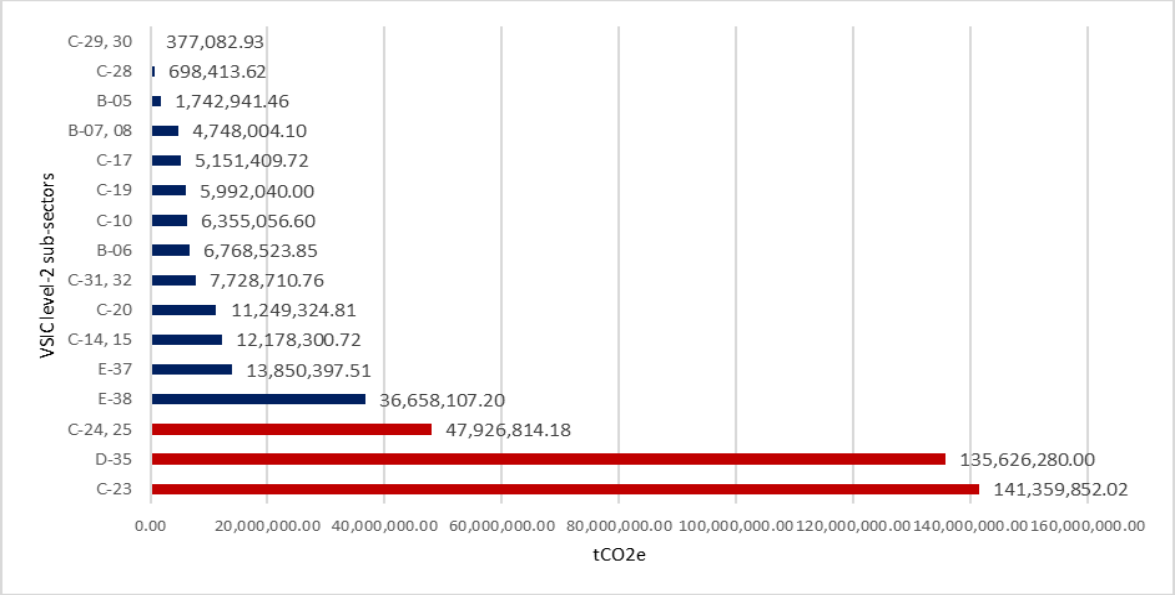

Figure 11: The GHG inventory results for level-2 sub-sectors in 2020

Source: The Consultant based on MONRE, 2020

According to the GHG inventory of level 2 sub-sectors, the three highest-emitting sectors are:

- C-23 - Manufacture of other non-metallic mineral products, total emissions 141,359,852.02 tCO_2e
- D-35 - Manufacture and distribution of electricity, gas, hot water, steam and air conditioning, total emissions 135,626,280.00 tCO_2e
- C-24 - Manufacture of metal and production of fabricated metal products and manufacture of fabricated metal products, total emissions 47,926,814.18 tCO_2e

Within sectors C-23, C-24, 25, and D-35, the sub-sectors for the manufacture of cement (C-23941), the manufacture of iron, steel, and pig iron (C-241), and thermal power generation (D-35112, 3) is identified as the largest emitters, accounting for over 50% of total emissions within these groups. The corresponding share of GHG emissions from thermal power, cement, and iron/steel & pig iron production in the Level 2 sub-sectors is illustrated in Figure below.

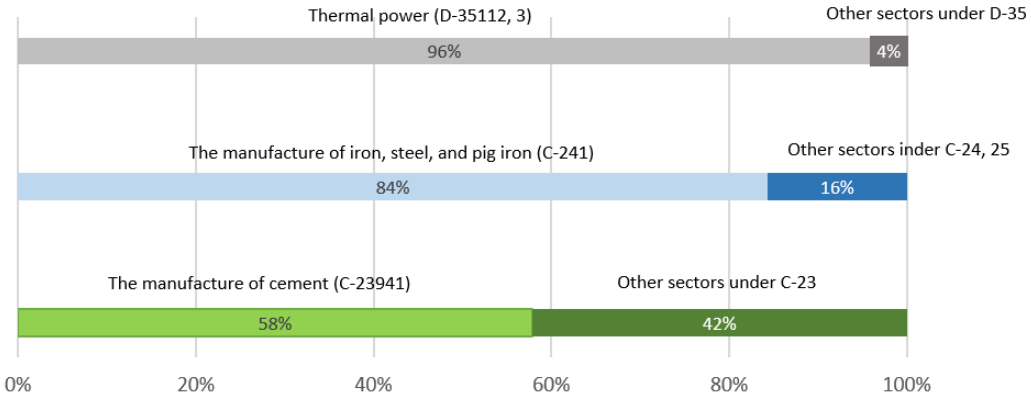

Figure 12: GHG emissions from thermal power, cement, and steel & pig production in level-2 sub-sectors

Source: The Consultant, based on National greenhouse gas inventory data, MONRE, 2020

The trade intensity of these sectors is calculated based on the following formula:

$$Trade\ Intensity\ (TI) = \frac{(Imports + Exports)}{Total\ market\ size} \times 100\%$$

Based on the calculation of trade intensity (TI) above, the results of TI of these three sectors are shown in Table below:

Table 20: Trade intensity results for the cement, thermal power, and iron & steel sectors

Code	Sectors	Trade Intensity (TI) (%)
C-23941	Manufacture of cements	33
C-241	Manufacture of iron, steel, and pig iron	48
D-35112, 3	Thermal power	0.01

Source: The Consultant, based on National General Statistic Office data, 2020

The results show that thermal power has low trade exposure (TI nearly 0%), while both cement and steel are highly trade exposed, with TI around 33% and 48%, respectively. Thus, the cement and steel sectors have high potential for CBAM. In fact, the EU already covered these sectors in their CBAM regulations.

From the above analysis, thermal power is a high-emission and low trade-exposed sector and thus should be included in the ETS immediately. On the other hand, the steel and cement sectors are high-emission and high-trade-exposed sectors, and thus should be gradually included in the ETS. The inclusion of these sectors in the first phase of ETS, however, would reduce the negative impacts if the trade partners of Viet Nam have already imposed carbon prices as well as CBAM in these sectors.

Therefore, it is deemed appropriate to include the steel, cement, and thermal power sectors in the pilot operation of the ETS starting in 2025, as proposed in the draft amended Decree No. 06/2022/ND-CP. The list of other GHG-intensive sectors with their corresponding trade exposure is provided in Annex 1 for the Government of Viet Nam to consider for further expansion of the ETS coverage in the future.

VI.1.2. Options for the point of regulation

Given the uncertainty in the existing regulations related to the point of regulation in Viet Nam's ETS, the following sections discuss different options to be considered:

VI.1.2.1. Sources of GHG emissions

Drawing from international precedents, two primary options warrant consideration: (i) Regulating solely Scope 1 emissions, which encompass direct emissions from sources owned or controlled by an entity, or (ii) adopting a broader approach that incorporates both Scope 1 and Scope 2 emissions, the latter including indirect emissions from purchased energy such as electricity. These options emerge as viable frameworks due to their alignment with differing objectives – simplicity and feasibility versus comprehensive coverage and environmental impact, each reflecting distinct trade-offs pertinent to Viet Nam's economic, regulatory, and emissions context.

The rationale for regulating only Scope 1 emissions lies in its practicality as an initial regulatory framework, particularly for jurisdictions establishing nascent carbon markets. Scope 1 emissions, arising from activities such as fuel combustion in industrial facilities or power generation, are directly attributable to specific entities, facilitating straightforward measurement, monitoring, and compliance. For Viet Nam, where coal-based power generation and industrial processes constitute major emissions sources, this option offers a focused mechanism to address key polluters. It enables the development of robust MRV systems without immediately overwhelming regulatory capacity. However, this approach excludes indirect emissions from electricity consumption, potentially constraining the ETS's ability to influence broader energy use patterns, a limitation that underscores the case for an expanded scope.

International examples reinforce this strategy. During the initial phase of ETS development, regions and countries such as the EU, China, and Mexico primarily focused on controlling Scope 1 emissions. This approach has proven effective in simplifying system design, reducing technical complexity related to MRV, and concentrating regulatory efforts on major sources of emissions where responsibility is clearly attributable. As these systems mature and the supporting data infrastructure becomes more reliable, many jurisdictions later expand their scope to include Scope 2 emissions.

Thus, for its pilot phase, Viet Nam should initiate its ETS by regulating only Scope 1 emissions. This approach provides a manageable and practical pathway, enabling authorities to prioritise key emission sources and build a solid MRV framework. Once institutional capacity and data quality have improved, the scope of the ETS can be gradually expanded to incorporate Scope 2 emissions, thereby enhancing its overall environmental effectiveness and contributing to Vietnam's long-term climate objectives.

VI.1.2.2. Activities boundary

When defining the scope of activities to be regulated under Viet Nam's ETS, two approaches were considered: (i) Covering all GHG-emitting activities within the facility boundary; or (ii) Concentrating solely on major GHG-emitting activities, such as crude steel production in the iron and steel sector and clinker production in the cement sector.

It should be noted that not all operations within these industries emit at comparable levels. Steel processing companies, or grinding stations that only crush clinker or cement, release far less than facilities producing crude steel or clinker from raw materials. In steelmaking, crude steel production – whether through blast furnace-basic oxygen furnace (BF-BOF) or electric arc furnace (EAF) technologies – dominates GHG emissions due to its high energy use and direct CO_2 output from chemical reactions or electricity consumption. For instance, EAF processes, even with lower emissions than BF-BOF, produce 461 – 616 kg CO_2 per ton of steel, while downstream activities like steel rolling emit just 117 – 153 kg CO_2 per ton, several times less. Similarly, in cement manufacturing, clinker production stands out as the primary emitter, driven by limestone calcination that releases substantial CO_2, dwarfing emissions from grinding stations processing clinker into cement. These two activities – crude steel and clinker production – represent the highest-emitting steps in their industries, making them essential targets for emission control.

Therefore, focusing the ETS boundary on these major GHG-emitting activities for all scenarios would ensure a targeted and effective approach to emission reduction.

Moreover, regulating all GHG-emitting activities within a facility would mix high- and low-emitting operations, skewing emission intensity benchmarks.

This focused approach also supports practical implementation, streamlining data collection, verification, and compliance for regulators and businesses, reducing administrative overhead and thus offering an efficient path to meet climate goals while sustaining industrial operations.

VI.2. Options for cap-setting

Given Viet Nam's ongoing industrialisation and reliance on coal-heavy power generation, the cap must accommodate growth while advancing decarbonisation. Two cap-setting approaches – top-down NDC-based and bottom-up dynamic output-based – are assessed based on their ambition and the availability of required data, which critically influences their feasibility for Viet Nam's ETS pilot phase (2025 – 2028).

A top-down approach sets the cap based on national emissions reduction targets derived from policy commitments, such as Viet Nam's NDC and JETP. This method ensures that the cap aligns with macro-level climate objectives and is relatively simpler to implement. Given Viet Nam's current data constraints, a top-down approach provides a practical pathway for setting caps without requiring extensive facility-level emissions inventories. Furthermore, aligning the ETS with national policy commitments ensures coherence with existing climate strategies and international obligations.

A bottom-up approach, in contrast, aggregates emissions at the sectoral or facility level, considering historical emissions data and sector-specific mitigation potential. While this method allows for a more precise and adaptable cap, it demands detailed, verifiable emissions inventories, which may pose a challenge due to Viet Nam's current data limitations. Therefore, given the necessity for a straightforward and policy-aligned approach, the top-down method is the preferred option for Viet Nam's ETS cap setting.

Considering the availability of emissions data and Viet Nam's policy framework, two options were selected for cap-setting under the top-down approach:

- Option 1: Based on the unconditional scenario in NDC
- Option 2: Based on the conditional scenario in NDC
- Option 3: Based on the conditional scenario in NDC with JETP scenario

Option 1 ensures that Viet Nam meets its unconditional NDC targets without reliance on international support, making it a more autonomous and predictable approach. Meanwhile, Option 2, based on the conditional NDC scenario, allows for more ambitious reductions contingent on international financing and technology transfer. Option 3, based on the conditional scenario in NDC with JETP scenario, is the most ambitious option and subject to the implementation of the Resource Mobilization Plan of Viet Nam. These options provide flexibility in determining emissions reductions while ensuring alignment with national commitments.

The Figure below presents the predicted national GHG emissions, evaluated based on Viet Nam's NDC 2022.

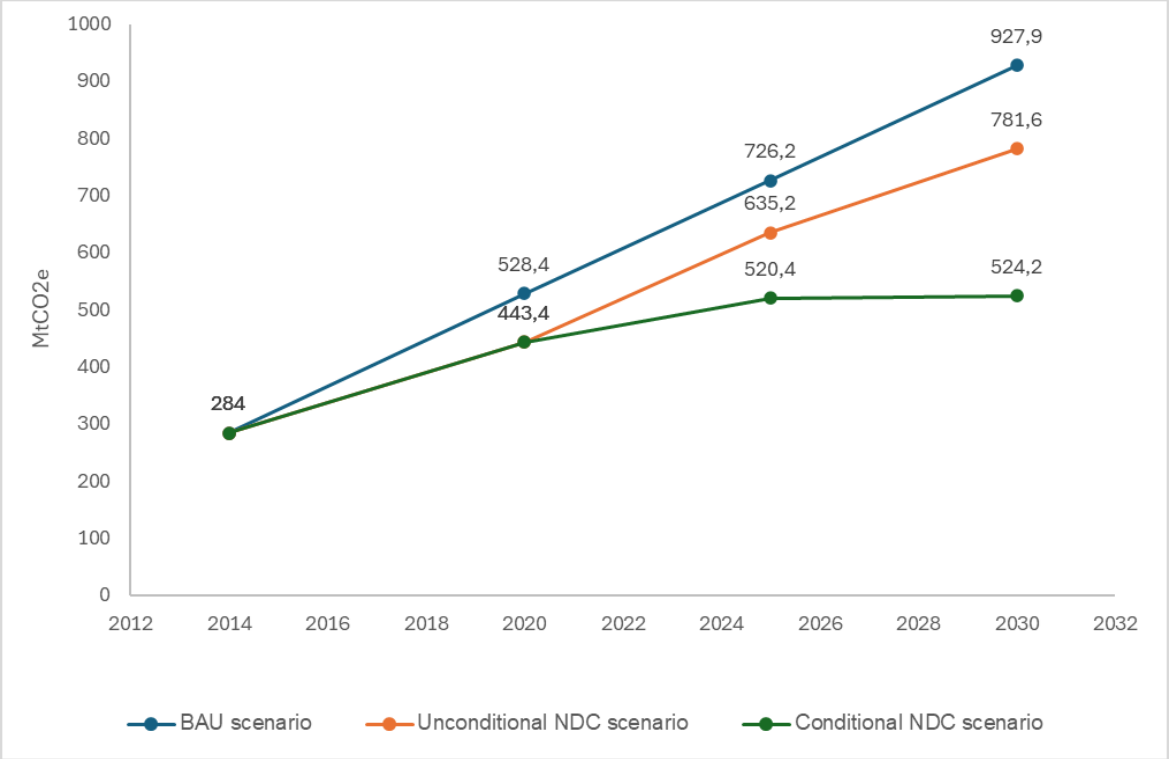

Figure 13: National GHG emissions under BAU, unconditional and conditional NDC scenarios

Source: The Consultant elaborated based on Viet Nam's NDC 2022

The unconditional scenario, which aims to reduce emissions by 15.8% (146.3 million tCO_2e) by 2030, represents a cap aligned with Viet Nam's domestically driven mitigation efforts. This option provides regulatory certainty for industries, ensuring that emission reductions are achievable using national resources, including state budgets, private sector investments, and public contributions. By setting the cap based on this scenario, the ETS can function effectively under current economic and policy conditions while preparing industries for deeper reductions over time.

Meanwhile, the conditional scenario, which targets a 43.5% (403.7 million tCO_2e) reduction by 2030, can serve as a more ambitious cap-setting pathway if sufficient international financial and technological support is secured. This option aligns with Viet Nam's long-term decarbonisation goal, i.e. net-zero target by 2050, and has potential for adoption of international collaborative approaches under Article 6 of the Paris Agreement. Implementing this scenario as a cap-setting option would drive industries to adopt cleaner technologies and lower their emissions intensity, but it requires strong financial incentives, capacity-building, and policy support to ensure compliance.

The conditional with JETP scenario reflects the commitment of Viet Nam to accelerate the decarbonisation of the electricity system from the current net-zero planning peak of 240 $MtCO_2e$ by 2035, with international support towards reaching a peak of no more than 170 $MtCO_2e$ emissions from electricity generation by 2030, enabled by meaningful and strong support from IPG partners.

The general formula for determining the cap under the chosen options is:

$$Cap_{ETS\ (y)} = GHG_T \times \frac{E_{ETS\ (y-1,y-2,y-3)}}{E_{Nat(y-1,y-2,y-3)}}$$

Where:

- $Cap_{ETS\ (y)}$: The limit on the amount of GHGs that can be emitted in the year y (tCO_2e)
- GHG_T: The target for the allowable amount of GHG emissions in year y under the scenarios outlined in NDC (tCO_2e)
- $E_{ETS\ (y-1,y-2,y-3)}$: Average emissions generated by entities that are subject to allocation in the year y-1, y-2, y-3 (tCO_2e)
- $E_{Nat(y-1,y-2,y-3)}$: Average national emissions in the year y-1, y-2, y-3 (tCO_2e)

In this formula, the reserve for new entrants is explicitly included within the total emission cap. This is because the NDC targets, whether based on the unconditional or conditional scenario, and conditional with JETP scenario have already factored in the expected growth rates of different sectors. By incorporating sectoral expansion into the cap-setting process, the system ensures that new or expanding businesses have access to allowances without distorting the overall emissions reduction trajectory. This approach prevents the need for future adjustments that could undermine market stability while maintaining a balance between environmental goals and economic development.

Under the unconditional scenario, cap adjustments should be based on domestic economic and emissions trends, ensuring alignment with Viet Nam's self-determined emissions reduction pathway. The primary criteria for adjustments would include national GDP growth, sectoral emissions intensity, and technological improvements that enhance emissions efficiency. Conditions for cap adjustments should include significant shifts in emissions trends due to policy changes or unexpected economic fluctuations. The methodology for adjustments should rely on sector-based benchmarking, considering emissions intensity relative to output, while maintaining the absolute reduction trajectory in line with the unconditional NDC scenario. Cap-setting should occur every five years, with biennial reviews to ensure policy consistency and allow for necessary recalibrations.

For the conditional scenario, cap adjustments should incorporate both domestic and international factors, given the reliance on external support for more ambitious reductions. Criteria should include international funding availability, technological transfer progress, and commitments made under international climate agreements. Adjustments should be triggered by significant variations in pledged international support or changes in Viet Nam's broader climate policy. A hybrid methodology should be adopted, combining absolute reduction targets with flexibility mechanisms that account for conditional mitigation potential. Similar to the unconditional scenario, the cap-setting period should be five years, but more frequent interim reviews (every two years) should be conducted to assess the feasibility of meeting conditional targets based on evolving external support conditions.

Banking, which allows entities to save unused allowances for future compliance periods, is a critical feature in many established ETSs. In Viet Nam's ETS, banking can enhance market stability by reducing price volatility and incentivising early abatement efforts. Given Viet Nam's expected increase in emissions before peaking, banking provides flexibility for entities to invest in low-carbon technologies ahead of stricter caps. However, excessive banking may lead to allowance oversupply, suppressing carbon prices and weakening the system's effectiveness. To mitigate this, Viet Nam could impose quantitative limits on banking or restrict the transfer of allowances between phases.

Borrowing, which permits the use of future allowances for current compliance, presents higher risks. While it can provide short-term flexibility for firms struggling to abate emissions immediately, it may encourage delays in mitigation and create financial instability. In Viet Nam, where emissions are expected to rise in the near term, borrowing could lead to future shortfalls in allowances and compromise long-term reduction targets. Additionally, weak financial oversight may increase the risk of non-compliance. Given these concerns, explicit borrowing should be restricted, though limited short-term flexibility – such as early access to future allowances – could be considered to support market liquidity.

For Viet Nam's ETS, a well-regulated banking system can support cost-effective abatement while ensuring long-term emission reductions. Banking should be permitted with safeguards, such as phase-specific limits or sector-specific thresholds. Borrowing, however, should be avoided due to the risks of delaying mitigation and creating financial instability. Instead, mechanisms such as market stability reserves or price corridors could be explored to address market fluctuations.

Offset credits should be permitted to enhance compliance flexibility while maintaining environmental integrity. Domestic offset projects should be prioritised, including forestry initiatives, renewable energy, and energy efficiency programs, to align with Viet Nam's sustainable development objectives. International offsets may also be considered, particularly those verified under the UNFCCC's Article 6 framework or voluntary carbon standards such as the Verified Carbon Standard, Gold Standard and Global Carbon Council (the use of international offsets, however, should be carefully regulated to uphold environmental integrity, market stability and ensure that the ETS effectively contributes to domestic emissions reductions). A robust MRV system should be established, incorporating independent third-party audits and integrating national protocols with internationally recognised certification processes to prevent double-counting.

Currently, Decree No. 06/2022/ND-CP stipulates that facilities may use offset credits to cover up to 10% of their total allocated allowances for compliance, while the draft amended Decree No. 06/2022/ND-CP is considering increasing this limit to 20%. Options regarding these offset credit limits will be examined for inclusion in the impact assessment scenarios for ETS governance options.

VI.3. Options for allowance allocation

Allowance allocation in Viet Nam's ETS should align with the cap-setting options while ensuring fairness, transparency, and economic feasibility. Given Viet Nam is in the early stage of ETS implementation, free allocation of allowances is proposed to be applied in the pilot phase to facilitate a smooth transition to carbon pricing while preventing excessive burdens on businesses

and reducing administrative complexity. Under both unconditional and conditional NDC cap-setting approaches, a fixed historical benchmarked allocation is selected as the exclusive method for distributing allowances during the ETS pilot phase. This approach outperforms alternatives like grandfathering or auctioning by driving efficiency improvements, supporting industrial development, and adhering to Viet Nam's regulatory and economic context, making it the optimal choice for the system's early stages.

Fixed historical benchmarking allocates allowances based on a facility's GHG emission intensity per unit of output, using 2020–2022 data as a baseline, adjusted to reflect growth and emission reduction targets. This performance-based method rewards facilities in sectors like thermal power, iron and steel, and cement for producing with lower emissions per ton of output, such as crude steel or clinker, fostering cleaner practices without constraining production growth. In contrast, grandfathering, which relies solely on historical emissions, risks entrenching inefficiencies by favouring facilities with higher past emissions, potentially disadvantaging newer or more efficient operations. Such an approach would fail to incentivise technological advancements, hindering Vietnam's long-term decarbonisation goals in energy-intensive industries.

Furthermore, fixed historical benchmarking allocation introduces a performance-based allocation method that ensures efficiency improvements while supporting sectoral growth through the introduction of the adjustment factor (AF). Instead of allocating allowances solely based on past emissions, benchmarking links allocation to GHG intensity per unit of output, encouraging lower emissions per unit of production. A general formula for allocating allowances through benchmarking has been proposed in the Annex to the Draft amended Decree 06/2022/ND-CP. Accordingly, the GHG emission allowance allocated to a facility is calculated using the following formula:

$$A_{a,y} = P_{a,(y-1;y-2;y-3)} \times B$$

Where:

- $A_{a,y}A_{a,y}$: GHG emission allowance allocated to facility a in year y (tCO_2e).
- $P_{a,(y-1;y-2;y-3)}P_{a,(y-1;y-2;y-3)}$: Average production output of facility a over three years y-1, y-2, y-3 (e.g., kWh for thermal power plants, tonnes of crude steel for steel production facilities, tonnes of clinker for cement production facilities).
- B: Average GHG emissions per unit of production for facilities of the same type (facility 1 to facility n), which are allocated allowances (tCO_2e per unit of product), determined using the following formula:

$$B = \frac{\sum_1^n E_{(y-1;y-2;y-3)} \times (100\% - T)}{\sum_1^n P_{(y-1;y-2;y-3)}}$$

Where:

- $E_{(y-1;y-2;y-3)}E_{(y-1;y-2;y-3)}$: Average emissions of the facility over the past three years y-1, y-2, y-3 (tCO_2e).
- T: GHG emission reduction target for year y for facilities of the same type (%)

However, drawing on the experiences of Korea's ETS, China's ETS, and Alberta's Technology Innovation and Emissions Reduction program, it is recommended that the allowance allocation formula incorporate a correction or adjustment factor. This plays a crucial role in ensuring that the total volume of allocated allowances aligns with the overall emissions cap and enhances flexibility and fairness in distribution, allowing the regulator to account for external factors such as economic fluctuations, data uncertainty, or transitional support needs, while still maintaining environmental integrity. In Viet Nam, regulations clearly require that the allocation of allowances takes into account the projection of GHG emissions of the facility based on business plan; emission reduction potential of the facility; technical, technology and financial capacity of the facility for implementing emission reductions measures, the introduction of AF is necessary to reflect these considerations. Therefore, the formula in the Annex of the draft amended Decree 06/2022/ND-CP is proposed to be revised as follows:

$$A_{a,y} = P_{a,(y-1,y-2,y-3)} \times B \times AF$$

Where:

- $A_{a,y}$: GHG emission allowance allocated to facility a in year y (tCO_2e).
- $P_{a,(y-1,y-2,y-3)}$: Average production output of facility a over the past three years (e.g., kWh for thermal power plants, tonnes of crude steel for steel production facilities, tonnes of clinker for cement production facilities)
- AF: Adjustment factor that reflects considerations in allocating allowances for the facility, such as target emission reductions; business plan; emission reduction potential; technical, financial and technology capacity of the facility for emission reductions
- B: Average GHG emissions per unit of production for facilities of the same type, determined using the following formula:

$$B = \frac{\sum_1^n E_{(y-1;y-2;y-3)} \times (100\% - T)}{\sum_1^n P_{(y-1;y-2;y-3)}}$$

Where:

- $E_{(y-1;y-2;y-3)}$: Average emissions of the facility over the past three years (tCO_2e).
- T: GHG emission reduction target for year y, expressed as a percentage for facilities of the same type

This approach incentivises efficiency improvements, as businesses with lower emissions per unit of production receive a relative advantage. This approach drives cleaner production practices, directly supporting Vietnam's climate commitments under the NDC targets. Tailored to Viet Nam's developing economy, it balances ambition with feasibility, with benchmarks designed to tighten gradually during the ETS pilot phase to ensure sustained progress toward decarbonisation without disrupting industrial development.

For free allocation, a phased approach fits both NDC scenarios. Initially, the allowances are proposed to be allocated free of charge – mirroring Mexico's ETS – using 2020–2022 emissions adjusted for growth and reduction targets, ensuring fairness and easing compliance under the unconditional target's modest cuts and the conditional target's stringent reductions, bolstered by enhanced MRV capacity.

As the ETS matures, free allocation can be phased down post-2028 at 10% (unconditional NDC) or 15% (conditional NDC) of allowances via uniform-price or sealed-bid formats, inspired by EU ETS Phase 3. The auction percentage should increase incrementally in order to generate revenue to fund renewable energy projects and industrial decarbonisation, such as solar or wind capacity expansions aligned with Viet Nam's Power Development Plan (PDP8). To maintain transparency, auction schedules and rules should be published annually, detailing dates, volumes, and reserve prices, allowing participants to plan effectively and build public trust in the ETS.

VI.4. Considerations for impact assessment

For the range of design and governance options of Viet Nam's ETS under review, the Consultant evaluates their potential impacts – looking at effects on economic activity, employment, energy costs, and environmental outcomes. From this, specific impacts, such as shifts in industrial production, compliance costs, or emission reductions, are singled out for quantitative analysis through modelling. This dual approach helps clarify the implications of each option and guide stakeholders toward an ETS that fits local needs.

The three selected key ETS design and governance elements – scope & coverage (sector coverage, emissions sources, activities scope), cap setting (reduction scenarios and offset options), and allowances allocation – have been defined and different options for their formulation are combined into 9 distinct scenarios for further refining and quantitative impact assessment, as described in the Figure below.

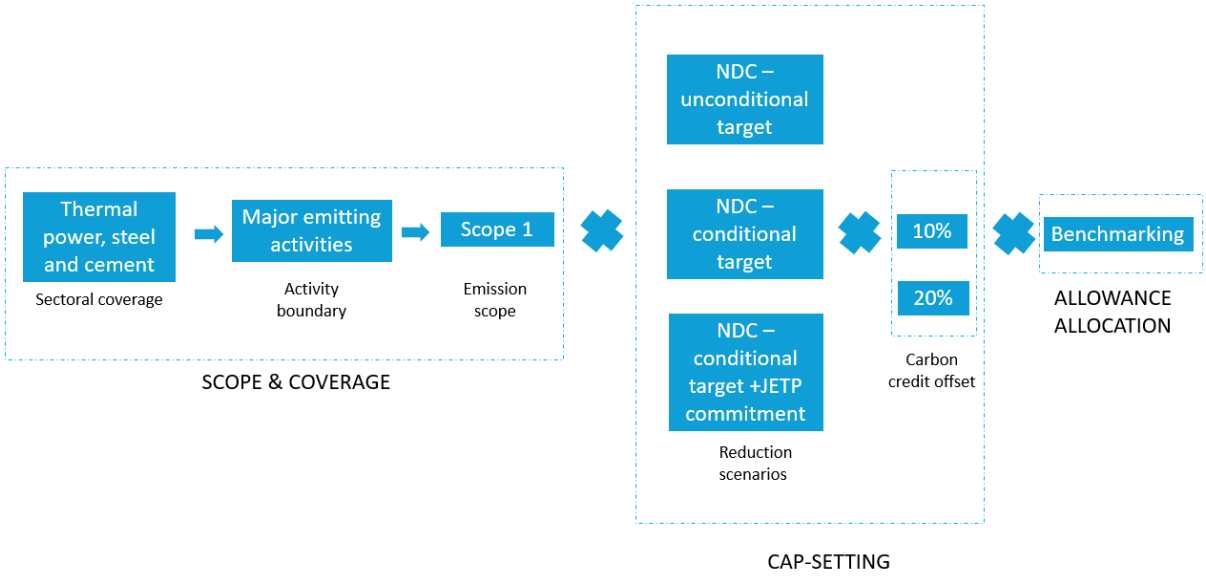

Figure 14: Approach to formulate different ETS scenarios for impact assessment

A detailed description of each scenario is provided in Table below. The scenarios are presented in the order of increasing complexity, from a leaner system (e.g., Scenario 1) to a more expansive one (e.g., Scenario 9).

Table 21: Different ETS scenarios for impact assessment

Scenarios	Sector Coverage	Point of Regulation	Cap Setting	% Carbon offset
1	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Unconditional NDC target	0%
2	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Unconditional NDC target	10%
3	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Unconditional NDC target	20%
4	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Conditional NDC target	0%
5	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Conditional NDC target	10%
6	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Conditional NDC target	20%
7	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Conditional NDC target + JETP commitment	0%
8	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Conditional NDC target + JETP commitment	10%
9	Thermal power, iron & steel, cement	Direct emissions (Scope 1) from major GHG-emitting activities (e.g., crude steel, clinker production)	Conditional NDC target + JETP commitment	20%

Source: The Consultant

VII. RECOMMENDATIONS

Viet Nam will pilot its ETS from June 2025 through the end of 2028, with the period leading up to June 2025 dedicated to finalising the requisite legal framework. Currently, the draft Decree No. 06/2022/ND-CP is undergoing amendments to provide clearer regulations for the pilot phase of the ETS. In this context, the following recommendations are proposed to further enrich and validate the Government's considerations regarding the scope & coverage, cap-setting, and allowance allocations of the ETS, thereby contributing to the refinement of the draft amended Decree No. 06/2022/ND-CP.

VII.1. Recommendations for scope & coverage

Two key aspects should be prioritised for further clarity: (i) Sectoral coverage and (ii) The point of regulation.

- Sectoral Coverage: Drawing from international experience, ETSs typically begin with high-emission sectors before expanding further. Based on the in-depth analysis in Section VI, thermal power is a high-emissions, low trade-exposed sector and thus should be included in the early stage of the ETS. The cement and steel sectors are high-emission and highly trade-exposed. These sectors are vulnerable to CBAM and thus should also be included in the pilot phase to reduce the negative impacts. This approach maximises climate impacts while minimising administrative burden and trade disruption, while allowing for lesson learning and system refinement before broader sectoral expansion in later phases.
- Point of regulation: Two aspects should be considered:
    - Emission sources: It is recommended to cover only Scope 1 emissions, as these are simpler to administer. Including Scope 2 emissions could significantly increase administrative complexity and raise compliance costs for energy consumers.
    - Activity scope: The ETS pilot phase should focus on major GHG-emitting activities at the facility level, including electricity generation for thermal power plants, crude steel production, and clinker production for cement plants. This ensures significant emissions coverage, facilitates simplified MRV, and allows facilities to gradually adapt before system expansion in later phases.

VII.2. Recommendations for cap-setting

For cap-setting, lessons from mature ETSs like the EU ETS and South Korea ETS show that they initially adopted a top-down approach. Therefore, for the pilot phase of Viet Nam's ETS, a top-down cap-setting approach aligned with Viet Nam's climate commitments, i.e. NDC & JETP targets, is recommended. Further considerations should determine whether the cap is set based on unconditional or conditional NDC or JETP targets, ensuring alignment with Viet Nam's climate commitments and implementation feasibility. Finally, carbon credit offset options, whether capped at 10% or 20% of allocated allowances, will be considered to evaluate their suitability for Viet Nam's ETS.

VII.3. Recommendations for allowance allocation

For allowance allocation, a 100% free allocation is recommended for the pilot phase of Viet Nam's ETS. To ensure alignment with sectoral and industrial development plans, the benchmarking methodology should be tailored to reflect the specific characteristics and emission profiles of key industries.

These recommendations will serve as the foundation for scenario development in Deliverable 3, where the Consultant will conduct a comprehensive impact assessment evaluating the economic and environmental implications of the proposed scenarios. The findings will provide evidence-based insights to support informed decision-making, ensuring that Viet Nam's ETS is effective in reducing emissions, economically viable, and aligned with the country's long-term development goals.

VIII. CONCLUSIONS

The development of an ETS in Viet Nam marks a significant step in adopting carbon pricing mechanisms to achieve the country's climate commitments, as outlined in its NDCs and the net-zero target by 2050. With the ETS pilot phase set to commence in June 2025, finalising the legal framework and defining key design and governance elements - including scope & coverage, cap-setting, and allowance allocation - is crucial for ensuring the effective implementation of the system.

Under this report, the Consultant outlined key design principles to establish a comprehensive foundation for ETS development. An in-depth review of international case studies – focusing on mature ETS models and those with similar economic and regulatory contexts – provided valuable lessons and implications for Viet Nam. Additionally, an analysis of existing national regulations, compared against international best practices, helped identify key gaps. Based on these insights, design and governance options and recommendations were proposed.

For the pilot phase, it is recommended to prioritise high-emitting sectors, including iron & steel, thermal power, and cement, ensuring a focused and effective approach to emissions reduction. The point of regulation should consider covering only Scope 1 emissions, balancing administrative feasibility with emission reduction potential. The activity scope should target major GHG-emitting activities within the covered entities to streamline monitoring and compliance. For cap-setting, a top-down approach should be applied, with considerations for both conditional and unconditional NDC and JETP targets to align with national climate commitments, along with the inclusion of potential offset options. Finally, for allowance allocation, the application of the benchmarking method should be considered to ensure alignment with sectoral development plans and long-term economic strategies.

These options and recommendations will undergo further quantitative impact assessment to provide evidence-based insights for the policy-makers. As the first comprehensive study of its kind in Viet Nam, this study lays the groundwork for a well-structured, effective ETS, ensuring that Viet Nam's carbon market is not only aligned with international best practices but also tailored to the country's unique economic and regulatory landscape. This marks a pivotal step toward achieving Viet Nam's long-term climate goals, fostering a resilient, low-carbon economy while maintaining economic competitiveness on the global stage.

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ANNEX

Annex 1: Leakage assessment for high-GHG emission sectors in Viet Nam

Code	Sectors	Trade intensity (TI)	Emission Intensity (EI) ($kgCO_2/eur$)	Carbon leakage indicator (CLI)
C-23	Manufacture of other non-metallic mineral products	0.41	53.85	21.91
C-23941	Manufacture of cements	0.33	65.69	21.89
C-241	Manufacture of iron, steel, and pig iron	0.48	10.32	4.98
C-20	Chemical manufacturing and chemical products production	0.80	3.94	3.14
C-24, 25	Manufacture of metal and production of fabricated metal products and manufacture of fabricated metal products	0.53	5.40	2.86
B-07, 08	Mining of metal ores and other mining activities	0.55	4.31	2.36
C-14, 15	Apparel manufacturing, leather and related products manufacturing	1.64	1.31	2.16
C-31, 32	Manufacture of beds, cabinets, tables, chairs, and other furniture	1.08	1.44	1.56
C-17	Manufacture of paper and paper products	0.39	3.05	1.18
C-19	Production of coke, manufacture of refined petroleum products	0.21	4.92	1.04
B-06	Extraction of crude oil and natural gas	0.65	1.57	1.02
B-05	Mining of hard and lignite coal	0.46	1.29	0.60
C-10	Food production and processing	0.59	1.01	0.60
D-3512,3	Thermal power	0.01	8.15	0.04
D-35	Manufacture and distribution of electricity, gas, hot water, steam and air conditioning	0.00	7.84	0.03
E-37	Wastewater drainage and treatment (excluding drainage systems)	0.00	106.77	0.00
E-38	Waste collection, treatment, and disposal; material recycling (excluding waste collection and material recycling)	0.00	329.99	0.00

Source: The Consultant