SECOND MILESTONE REPORT

(Final Submission)

Assessment of Country's Readiness and International Experience for Carbon Trade Exchange Design

Hanoi, 2024

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COLOPHON AND DISCLAIMER

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EXECUTIVE SUMMARY

The emission trading scheme (ETS) offers a cost-effective means for countries to reduce greenhouse gas (GHG) emissions by putting a price on emissions through a market-based approach. Viet Nam decided to develop a domestic carbon market based on trading emission allowances and carbon credits in the 2020 Law on Environmental Protection.

Decree No. 06/2022/ND-CP of the Government on mitigation of GHG emissions and protection of the ozone layer defines that the trading of emission allowances and carbon credits in the carbon market shall be performed on a carbon trade exchange (CTX), which is scheduled for pilot operation from 2025 and official operation in 2028. The Ministry of Finance (MOF) is assigned to coordinate the establishment and development of CTX and formulate a financial management mechanism for the operation of the carbon market in Viet Nam.

To support the MOF and line ministries with the establishment and operation of the CTX, the Energy Transition Partnership (ETP) under the United Nations Office for Project Services (UNOPS) implemented the Technical Assistance on Assessment of Country's Readiness and International Experience for Carbon Trade Exchange Design. The objective of this Study is to provide the MOF with a comprehensive understanding of the country's existing relevant legal, institutional framework, and infrastructure conditions and the gaps to be fulfilled for the establishment and operation of the CTX in Viet Nam.

The Report looked at 21 existing ETSs in the world with operating CTXs to select case studies based on six criteria (years of operation, contextual similarity, traded volume, transaction price, use of carbon credits, and linking) for the in-depth analysis of international experience concerning legal, institutional, and infrastructure requirements for the CTX. After the multi-criteria analysis, four ETSs with the highest rankings were selected, namely UK ETS, New Zealand ETS, California ETS, and Korea ETS. Selected case studies fulfilled several of the following criteria: a long history of ETS operation (at least more than 5 years), high contextual similarity to Viet Nam (ETS at the national level, located in Asia, with a developing economy), and top traded volume of allowances (over 20 million tCO_2) with efficient transaction prices (over USD 10). Among the chosen ETSs, some ETSs allow the use of carbon credits and have linkages to other ETSs. The multi-criteria analysis aimed to ensure that the selected case studies have a similar country context with Viet Nam and can offer the most relevant experiences for the establishment and operation of the CTX.

The review of international experience showed that a robust regulatory framework is a cornerstone of a credible CTX. Each country established its exchange under a dedicated law, supported by comprehensive regulations and guidelines governing allowance trading, market oversight, and participant compliance. On the other hand, aligning this framework with international standards further bolstered transparency and market integrity.

None of the case-study countries/jurisdictions opted for the creation of a new exchange, instead leveraging existing financial platforms within their jurisdictions. Among them, only California utilized the Western Climate Initiative program as an auction platform, the remaining countries conducted auctions through designated carbon trade exchanges. Additionally, the secondary market structure varied, with California and New Zealand featuring multiple platforms, while Korea and the UK employed a single exchange model. Besides the exchanges, i.e., auctioning platform and secondary trading platform(s), the emission trading registry, the resettlement and clearing house are the most important infrastructure for the ETS and operate in connection to the CTX.

However, the case studies also revealed implementation challenges, ranging from market volatility and oversight issues to regulatory gaps. These challenges, in turn, spurred the development of robust compliance measures, enhanced market surveillance mechanisms, and required effective risk management strategies to mitigate volatility and ensure regulatory adherence. Additionally, the importance of strong institutional capacity, coupled with active stakeholder engagement, emerged as crucial for effective exchange and market management as well as for promoting an inclusive and transparent system. Viet Nam can learn from their rich experiences ranging from the case studies to create a reliable and robust governance and policy framework, apply a cost-effective and efficient institutional arrangement approach and infrastructure to establish the CTX and the carbon market, and foresee and prepare solutions in advance to ensure seamless market operation.

Viet Nam has developed the legal and institutional framework for the carbon market and the CTX, most importantly through the 2020 Law on Environmental Protection and Decree 06/2022/ND-CP. Besides, there is also existing infrastructure based on exchanges for trading securities under the Vietnam Exchange (VNX) and commodities under the Mercantile Exchange of Viet Nam (MXV). However, there remain gaps for Viet Nam to address to move forward with the establishment and operation of the CTX.

In terms of legal gaps, the cap and the benchmark for allocation of allowances are not defined. There are no specific regulations on criteria for evaluating and determining the eligibility of carbon credits. The Monitoring, Reporting, and Verification (MRV) system has not been fully developed (there is a lack of guidance for GHG inventory in the transport and construction sectors and a list of verification entities is not promulgated). There is a need to develop legal regulations for the establishment of the registry, the establishment and operation of the CTX, and the establishment of financial mechanisms and measures for market management and oversight.

Regarding institutional gaps, it is necessary to formulate the charter for the designation of the national authorities to administer the operation of the registry and the CTX. A collaboration mechanism between MONRE and MOF, and the criteria for the assessment and approval of “other organizations and individuals'' to be eligible for investment and participation in the domestic carbon market should be clearly defined.

In terms of infrastructure, several crucial components necessary for the operation of the ETS are either not yet in place or are lacking. These include the national registry system, a comprehensive support system for ETS implementation encompassing a national database on GHG inventory data from covered facilities to manage and monitor emission caps, tools for allowance allocation, a centralized system for MRV of GHG emissions and reductions, as well as the CTX and the allowance auction platform.

In order to find solutions to address the above-mentioned legal, institutional, and infrastructure gaps, different options were provided to conceptualize the establishment of the operation of the CTX, which laid the foundation for formulating the corresponding recommendations in terms of legal, institutional, and infrastructure aspects.

First, in terms of the establishment of the CTX, under Decree 06/2022/ND-CP, MOF is assigned for the development and establishment of CTX while the Ministry of Natural Resources and Environment (MONRE) is assigned for pilot operation and official operation of the CTX. Under this context, the commodities exchange under the management of the Ministry of Industry and Trade would not fit in the overall existing legal and institutional framework for the domestic carbon market and CTX in Viet Nam. Therefore, the two potential options for the establishment of the CTX in Viet Nam are: i) **Option 1:** Establish the CTX based on the infrastructure system of the securities exchange; ii) **Option 2**: Develop a carbon trade exchange model independent from the stock exchange system, managed by the MONRE. Option 1 offers the advantage of leveraging existing infrastructure, manpower, and resources, whereas the strength of Option 2 lies in ensuring unified market management authority under MONRE.

Second, for operating the CTX, the Report identifies two options for structuring the primary market: i) **Option 1:** Free allocation of allowances for all covered entities (and certification of carbon credits eligible for transactions on the secondary market); and ii) **Option 2:** Free allocation of allowances combining with auctioning (and certification of carbon credits eligible for transactions on the secondary market). While Option 1 has the advantage of reducing the financial burden for the ETS-covered entities, Option 2 provides more incentives for enterprises to take GHG mitigation actions (since otherwise they have to pay for emissions with a higher cost than a completely free allocation system) and makes the market more active and liquid.

Two options are also proposed for structuring the secondary market: i) **Option 1:** Trading both allowances and carbon credits on a centralized system with separate panels for allowances and carbon credits; and ii) **Option 2:** Trading only allowances on a centralized system. In parallel, carbon credits can be purchased from the domestic or international voluntary carbon market. The advantages of Option 1 include more transparent market information (in terms of transacted prices and volumes) and more reliable transactions (due to the involvement of the clearing infrastructure) since the market is highly regulated. Option 2, however, offers more flexibility to allow linkage to the international carbon market.

Based on experiences from international experiences, national context, and stakeholder consultation under this Assignment, the recommended solution for establishing the CTX includes:

- MONRE will perform unified management of the carbon market that includes establishing the registry system for allowances and carbon credits; setting regulations for the MRV system and requirements for allowances, carbon credits, and market participants; deciding on the scope of utilizing the stock exchange system when the market participants engage in trading allowances and carbon credits in the secondary market;
- CTX will be established based on utilizing the services from the stock exchange system managed by MOF (with the participation of State Securities Commission (SSC), Viet Nam Exchange (VNX), Viet Nam Securities Depository and Clearing Corporation (VSDC), etc.)

The proposed legal documents to be developed in the near future to fill in the legal gaps for this option include:

- Decree issued by the Government on establishing and operating the pilot CTX;
- Decision issued by the Prime Minister assigning MONRE to develop and manage the carbon market;
- Decision issued by the Prime Minister to assign the operation of the pilot CTX to VNX, VSDC, and MONRE;
- Decision issued by MOF on adjusting the operating regulations of VNX and VSDC related to the pilot CTX;
- Other guiding documents for procedures to operate the CTX.

The recommended institutional arrangements include:

- **MONRE:** playing the leading role in the development and management of the carbon market, including the development and operation of the national registry system and the operation of the CTX and a comprehensive support system for ETS implementation encompassing a national database on GHG inventory data from covered facilities to manage and monitor emission caps;
- **MOF:** collaborating with MONRE for the design, development, and operation of the CTX, playing the leading role in the financial management of the carbon market, providing directions for SSC, VNX, and VSDC to fulfill the requirements for carbon transactions;
- **VSDC:** collaborating with the National Registry System for application/account management, performing depository, clearing and settlement for carbon transactions;
- **VNX**: assigning the suitable stock exchange (HNX or HOSE) to provide a trading platform for the execution of carbon transactions.

As for the infrastructure, it is recommended to develop the national registry, a primary and secondary trading platform for trading, a centralized MRV system, and a national

database of GHG inventory data to track the compliance of the covered entities. Based on the review and selection of a specific model for the operation of the CTX in the next phase, further details of the infrastructure for the CTX would be envisioned. It is therefore crucially important for relevant national authorities (MONRE and MOF) to discuss and agree on the selected option for the operation of the CTX before moving to the next steps, including finalization of the relevant legal framework, institutional arrangements, technical design, and infrastructure development for the CTX.

ABBREVIATION

AFOLU	Agriculture, Forestry, and Other Land Use
AB 398	Assembly Bill 398
AOHA	Aircraft Operator Holding Account
ARP	Auction Reserve Price
CARB	California Air Resources Board
CCER	China Certified Emissions Reduction
CCM	Cost Containment Mechanism
CCR	Cost containment reserve
CDM	Clean Development Mechanism
CEEX	China Emissions Exchange
CER	Certified Emission Reduction
CITSS	Compliance Instrument Tracking System Service
CME	Chicago Mercantile Exchange
CO_2	Carbon dioxide
COP26	26th Conference of Parties to the United Nations Framework Convention on Climate Change
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CTX	Carbon trade exchange
DEBS	Direct environmental benefits in the state
EEX	European Energy Exchange
EITE	Emissions-intensive and trade-exposed
ETS	Emission trading scheme
ETRS	Emissions Rights Registry System
EUAA	EU aviation allowance
EUA	EU allowance
FFCER	Fujian Forestry Certified Emission Reduction credit
FSA	Financial Services Administrator
GHG	Greenhouse gas
GIR	Greenhouse Gas Inventory and Research Center
HFC	Hydrofluorocarbon
HNX	Hanoi Stock Exchange
HOSE	Hochiminh Stock Exchange
ICE	Intercontinental Exchange
JCM	Joint Crediting Mechanism
KAU	Korea Allowance Unit
KCU	Korea Credit Unit
K-eco	Korea Environment Corporation
K-ETS	Korea Emissions Trading System
KOC	Korea Offset Credit
KRX	Korea Exchange
LEP 2020	2020 Law on Environmental Protection

MOF	Ministry of Finance
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MRV	Monitoring, Reporting, and Verification
$MtCO_2e$	Million tons of carbon dioxide equivalent
MXV	Mercantile Exchange of Viet Nam
NDC	Nationally Determined Contribution
NZ ETS	New Zealand ETS
NZ ETR	New Zealand Emissions Trading Register
NZU	New Zealand Unit
NZX	New Zealand Exchange
OHA	Operator Holding Account
OPO	Offset project operator
OPR	Offset project registry
ORS	Offset Registry System
OTC	Over the counter
PFC	Perfluorocarbon
PHCER	Tan Pu Hui Certified Emission Reduction
RGGI	Regional Greenhouse Gas Initiative
ROC	Registry offset credit
SHEA	Shanghai Emission Allowance
SSC	State Securities Commission
TOE	Tons of oil equivalent
UKA	UK Allowance
UKEA	UK Environment Agency
UPCOM	Unlisted Public Company Market
VNX	Viet Nam Exchange
VSDC	Viet Nam Securities Depository and Clearing Corporation
WCI	Western Climate Initiative

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I. INTRODUCTION

I.1. The role of a carbon trade exchange in an emission trading scheme

An emission trading scheme (ETS) offers a cost-effective means to reduce greenhouse gas (GHG) emissions by putting a price on the emissions through a market-based approach. In an ETS, a total emissions cap is imposed in one or more sectors and the regulator issues a number of allowances not exceeding the level of the cap to the covered entities. These entities can trade the allowances, resulting in a market price for the allowances (ICAP, 2021a). By making allowances a commodity that can be bought and sold, an ETS provides companies with a financial incentive to reduce their emissions. If a company can reduce its emissions more efficiently than another, it can profit from selling its excess allowances, while the company facing higher reduction costs can buy allowances at a lower price than they may do themselves to meet their emission obligations.

In addition to allowances, an ETS may allow regulated entities to utilize carbon credits generated from emission reductions or removals in sources and sectors not covered by the ETS to meet their compliance obligations. However, such usage typically comes with specific conditions, such as limitations on the maximum volume of credits that can be applied against total allowances. This provides "a new pool of low-cost compliance units for regulated entities and can significantly reduce ETS compliance costs" (ICAP, 2021a).

The allowances and credits can be traded in three ways: (i) direct trade between liable entities; (ii) trade facilitated by a broker (over-the-counter (OTC) trade), and (iii) exchange-based trade (ICAP, 2021b).

The operational successes of ETS across various countries underscore the pivotal role played by a Carbon Trade Exchange (CTX) in ensuring the effective functioning of such schemes. The CTX serves as a central platform for the transparent and credible trading of allowances and carbon credits among participating entities. The key functions of a CTX encompass:

(i) Market access: A CTX provides a centralized platform for a wide range of participants, which may include emitters, carbon project developers, financial institutions, and investors, to participate and trade allowances and carbon credits in the carbon market. This broadens the pool of potential buyers and sellers, increasing market liquidity (ICE, 2022).

(ii) Transparency and accountability: A CTX posts both the volumes traded and the prices at which the transactions occur instantaneously. This enhances transparency and accountability in the carbon market (Ecoeye, 2023). Participants can trust that transactions are executed fairly and reported accurately.

(iii) Market oversight and regulation: A CTX often operates under regulatory oversight to ensure the integrity of the trading system (Ecoeye, 2023). It enforces

rules and regulations to prevent fraud, market manipulation, and other forms of misconduct.

(iv) Market data and analysis: A CTX often provides data and analysis on market trends, trading volumes, and price movements (Ecoeye, 2023). This information can be valuable for market participants, regulators, and policymakers in making informed decisions related to regulation development, investment, and trading in the carbon market.

(v) Innovation and product development: A CTX can introduce new financial instruments and products, such as futures and options contracts, to help participants manage their carbon risks effectively. These financial instruments can hedge against future carbon price volatility (ICE, 2022).

The CTX operates in tandem with the registry system of the ETS. The registry system is responsible for recording and monitoring the allocation, transfer, and surrender of allowances (and carbon credits) (ICAP, 2021b). The CTX creates a centralized platform (like a marketplace) to facilitate the transactions of allowances (and carbon credits), provides transparent price signals, and ensures reliable transactions for market participants, which are important for compliance carbon market.

I.2. CTX development in Viet Nam

Viet Nam has actively committed to international agreements and has demonstrated ambition in reducing emissions. In the latest updated Nationally Determined Contribution (NDC) in 2022, Viet Nam has committed to reducing total GHG emissions by 15.8% by 2030 compared to the Business-As-Usual scenario with domestic resources and can reduce up to 43.5% when there is international support through bilateral and multilateral cooperation and implementation of new mechanisms under the Paris Agreement (The Government, 2022c). Moreover, at the 26th Conference of Parties to the United Nations Framework Convention on Climate Change (COP26), Viet Nam affirmed its commitment to achieving net-zero emissions by 2050. These ambitious pledges underscore Viet Nam's unwavering determination to align itself with global objectives in pursuit of a sustainable and resilient future.

To realize these ambitions, Viet Nam has laid a robust legal framework to foster the development and implementation of the domestic carbon market as a vital policy tool for attaining the nation's GHG emission reduction targets. This framework aims to establish a price on GHG emissions through an ETS as an important policy for reaching the GHG emission reduction objectives. Accordingly, provisions for the organization and development of the domestic carbon market were introduced in the 2020 Law on Environmental Protection (LEP 2020) (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 organization and development of the domestic carbon market. Accordingly, from now until the end of 2027, Viet Nam will promulgate regulations related to carbon credit

management and trading activities, allocation of GHG emission allowances as well as operation of a CTX and is expected to establish and pilot CTX from 2025 and officially operate it in 2028. The Ministry of Finance (MOF) is assigned to coordinate the establishment and development of CTX and formulate a financial management mechanism for the operation of the carbon market in Viet Nam (The Government, 2022b).

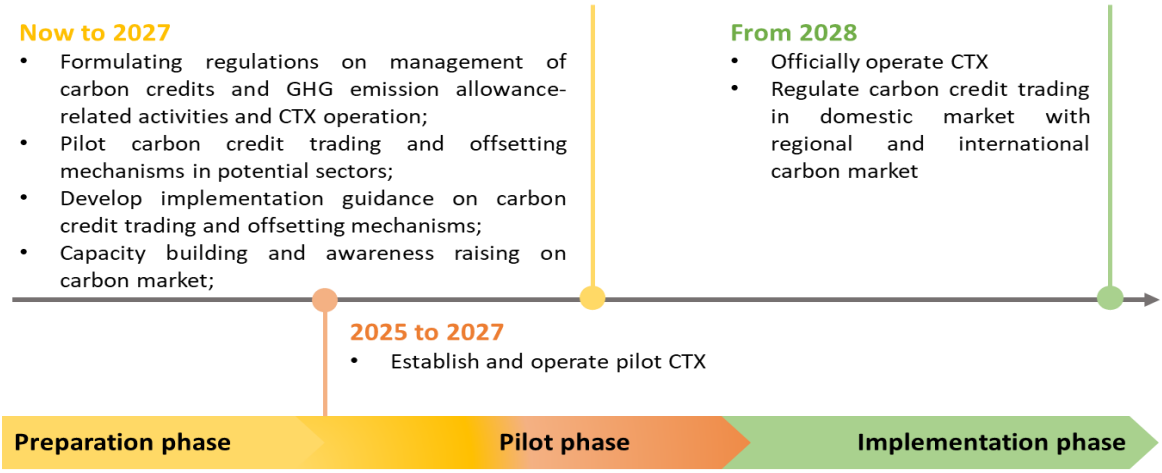

Figure 1: Roadmap for the development of the domestic carbon market with a focus on the CTX component

Source: Compiled by the Consultant based on the Government (2022a)

In pursuit of these objectives, a crucial step involves leveraging international experiences through comprehensive evaluations of existing national legal, infrastructure, and institutional frameworks. These assessments play a pivotal role in pinpointing critical gaps necessary for the development of both the carbon market and CTX. Adopting this multifaceted approach not only lays the groundwork for the forthcoming establishment and operation of the CTX but also propels Viet Nam to transit towards a low-carbon, green economy, fostering sustainable growth and advancing its net-zero emission targets.

I.3. Objectives and Structure of the Report

The Report aims to provide a set of recommendations for Viet Nam to establish and operate a well-functioning CTX based on the analysis of international experiences and the country's conditions. The Report includes five sections:

- Section 1 introduces the role of CTX in an ETS.
- Section 2 provides an overview of international experiences and an analysis of legal, institutional, and infrastructure requirements for the establishment and operation of CTX.
- Section 3 explores the national context and assesses existing regulations, institutions, and infrastructure relevant to the establishment and operation of CTX.

- Section 4 identifies legal, institutional, and infrastructure gaps, proposes solutions based on international experiences and Viet Nam's context in the CTX, and provides an implementation roadmap.
- Section 5 highlights the main findings of the study.

II. TASK 3: REVIEW OF INTERNATIONAL EXPERIENCES AND ASSESSMENT OF LEGAL, INSTITUTIONAL, AND INFRASTRUCTURE REQUIREMENTS FOR THE ESTABLISHMENT AND OPERATION OF THE CTX

II.1. Overview of operating CTX for ETS in the world

Carbon markets in the world exist in two forms: mandatory (compliance) markets where regulated entities obtain and surrender emissions permits (allowances) or offsets in order to meet predetermined regulatory targets, and voluntary carbon markets where private companies choose to buy carbon offsets "to re-sell or retire to meet carbon neutral or other environmental claims" (VCMI, 2021). The compliance carbon market is usually developed under an ETS.

As of 2023, there are 28 ETSs in force at various levels of governance, from city-level to supranational-level. The ETSs have covered about 17% of the total global GHG emissions. China ETS was established in 2021 and is currently the world's largest carbon market by emission with over 2,100 liable power stations participating in the scheme and the EU ETS is the world's largest carbon market by trading value with over 15 billion emission allowances traded on the Intercontinental Exchange (ICE) (World Bank, 2023).

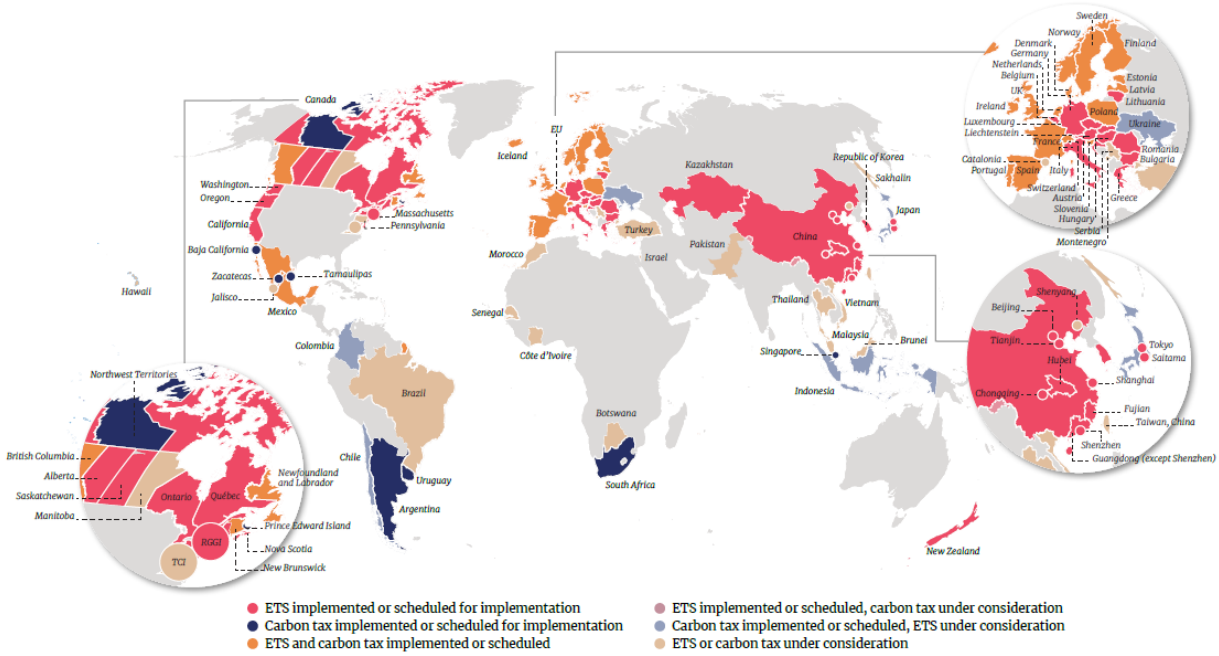

Figure 2: Map of carbon taxes and ETSs

Source: ICAP (2023a)

A CTX can serve to provide trading services for both compliance and voluntary carbon markets. However, not all the existing ETSs incorporate CTXs to facilitate the exchange of their allowances (and eligible carbon credits). The reasons are mainly due to the absence of auctions, the market size that is not sufficient for exchange-based transactions, or because the regulatory body does not want to control the price in the ETS. For example,

in the Tokyo ETS, allowances are allocated for free to facilities in the primary market rather than through auctions. In the secondary market, covered facilities and other entities trade credits via OTC, and the Tokyo Metropolitan Government does not control carbon prices in the market (ICAP, 2022).

Since Viet Nam defines CTX as "a center for processing transactions related to purchasing, selling allowances and carbon credits, and auctioning, borrowing, retiring and transferring allowances" (The Government, 2022b), the establishment of the CTX, therefore, should primarily serve for the purpose of operation of the ETS in Viet Nam but can still provide the trading service for voluntary offsetting purposes.

The following table summarizes 21 existing ETSs in the world with operating CTXs. The overview of the key information of these existing ETSs will provide inputs for the multi-criteria analysis for the selection of the case studies in the following section.

Table 1: Existing ETSs and their status of operating CTXs

No.	Jurisdiction	ETS features	CTX design
		Supranational level	
1	**EU ETS (EU Member States and Iceland, Liechtenstein, Norway)**	**Start of operation (year):** 2005 **Sectoral coverage:** Power, Industry, Aviation **Cap:** 1,529 million tons of carbon dioxide equivalent ($MtCO_2e$) (2022, stationary installations) 28.4 $MtCO_2e$ (2022, aviation) **Greenhouse gases:** CO_2, N_2O, PFCs **Allowance allocation:** Auctioning, Benchmarking **Offsets and credits:** Unlimited use in Phase 1 (2005-2007); Permitted up to 50% in Phases 2 & 3 (2008-2012 & 2013-2020); Not permitted in Phase 4 (2021-2030) **Average allowance price, secondary market price:** Average auction price: EUR 78.91 (USD 83.10) Average secondary market price: EUR 80.82 (USD 85.11) **Total revenue:** EUR 139.5 billion (USD 158.4 billion) since 2013	**Market participation:** Compliance entities and non-compliance entities **Primary market:** Uniform price auctions with single rounds and sealed bids, conducted daily by the European Energy Exchange (EEX) **Secondary market:** Spot, futures, options, and forward contracts on exchange and OTC **Legal status:** EU ETS emission allowances have been classified as financial instruments since 2018 **Traded volume:** Primary market: 401.3 million general EU allowances (EUAs) and EU aviation allowances (EUAAs) auctioned at EEX for Member States in 2022, raising EUR 39,1 billion[1] Secondary market: 8,785 million EUAs traded (exchange and OTC)[2]
		Country level	
2	**Germany National ETS**	**Start of operation (year):** 2021 **Sectoral coverage:** Transport, Buildings **Cap:** 291.1 $MtCO_2e$ (2022) **Greenhouse gases:** CO_2	**Market participation:** Compliance entities, non-compliance entities, and legal individuals **Primary market:** Auctions will be conducted on EEX in 2026 **Secondary market:** Allowances can be purchased on the secondary market throughout the year

[1] Calculated by Consultant based on *Auctions by the Common Auction Platform 2022* prepared by the European Commission, accessed at https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/auctioning_en

[2] Refinitiv. 2023. Carbon Market Year in Review 2022, accessed at https://www.refinitiv.com/content/dam/marketing/en_us/documents/gated/reports/carbon-market-year-in-review-2022.pdf

		Allowance allocation: Fixed price until 2025, auctioning thereafter **Offsets and credits:** Not permitted **Average allowance price, secondary market price:** Average allowance price: EUR 30 (USD 31.59) **Total revenue:** EUR 13.6 billion (USD 14.32 billion) since 2021	**Legal status:** Allowances do not have the status of financial instruments **Traded volume:** Primary market: 84.8 million EUAs and EUAAs auctioned at EEX for Germany in 2022, raising EUR 6.8 billion[3].
3	**Kazakhstan ETS**	**Start of operation (year):** 2013 **Sectoral coverage:** Power, oil & gas, Industry **Cap:** 163.7 $MtCO_2e$ (2023) **Greenhouse gases:** CO_2 **Allowance allocation:** Benchmarking **Offsets and credits:** Offsets are permitted with no limits **Average allowance price, secondary market price:** Average secondary market price: KZT 563 (USD 1.22) **Total revenue:** No Information	**Market participation:** Compliance entities, non-compliance entities, and legal individuals implementing offset projects, except brokers, banks, or other financial institutions **Primary market:** No auctioning **Secondary market:** Pure spot market, no forward contracts, or other derivatives. OTC is allowed since 2018. Trading platforms include Caspy Commodity Exchange JSC, and other exchange platforms signed agreements with the state registry – JSC "Zhasyl Damu" **Legal status:** Carbon unit (emissions allowance, offset unit) is a commodity permitted for transfer among the subjects of the carbon market in the Republic of Kazakhstan **Traded volume:** 52 transactions from 2018-2020, 39 transactions in 2021 (including direct), 50 transactions in 2022 (including direct)

[3] Lewandrowski, D., Pauly, N. 2023. Auctioning (EU ETS) – German Auctioning of Emission Allowances – Periodical Report: Annual Report 2022. Berlin: German Emissions Trading Authority (DEHSt) at the German Environment Agency, accessed at https://www.dehst.de/SharedDocs/downloads/EN/auctioning/2022/2022_annual-report.pdf?__blob=publicationFile&v=2

4	**Switzerland ETS**	**Start of operation (year):** 2008 **Sectoral coverage:** Power, Industry, Aviation **Cap:** 4.5 $MtCO_2e$ (2023, power and industry) 1.2 $MtCO_2e$ (2023, aviation) **Greenhouse gases:** CO_2, N_2O, CH_4, NF_3, SF_6, HFCs, and PFCs **Allowance allocation:** Benchmarking, Auctioning **Offsets and credits:** Not permitted from 2021 **Average allowance price, secondary market price:** Average auction price: EUR 76.49 (USD 80.55) **Total revenue:** EUR 99.3 million (USD 104.6 million) since 2008 **Other information:** Switzerland ETS has been linked with the EU ETS since 2020	**Market participation:** Compliance entities, non-compliance entities (domestic and international), and individuals **Primary market:** Auctions organized by Swiss Emissions Trading Registry **Secondary market:** OTC is only applicable for Swiss allowances. EU ETS allowances, which can be used for compliance in the Swiss ETS, are traded on multiple exchanges, including ICE Futures and EEX **Legal status:** Allowances do not qualify as financial instruments **Traded volume:** Primary market: 412,700 Swiss allowances auctioned in 2022
5	**United Kingdom ETS**	**Start of operation (year):** 2003 → 2005 →2021 **Sectoral coverage:** Power, Industry, Domestic Aviation **Cap:** 147.2 $MtCO_2e$ (2023) **Greenhouse gases:** CO_2, N_2O, PFCs **Allowance allocation:** Benchmarking, Auctioning **Offsets and credits:** Not permitted **Average allowance price, secondary market price:** Average auction price: GBP 75.42 (USD 92.96) **Total revenue:** GBP 10.4 billion (USD 12.9 billion) since 2021	**Market participation:** Compliance entities, non-compliance entities (domestic and international), and individuals **Primary market:** Auctions are managed by ICE Futures Europe **Secondary market:** UK Allowances are traded on the ICE Futures Europe exchange. Contracts for daily futures, futures, and options on futures contracts are available. OTC is possible **Legal status:** UK Allowances are considered as financial instruments **Traded volume:** Primary market: 81.3 million allowances auctioned in 2022[4], raising GBP 6.1 billion (USD 7.6 billion). 79 million UK Allowances expected in 2023

[4] Calculated by Consultant based on Reports for UK Emissions Auctions in ICE Report Center, accessed at https://www.ice.com/report/278

			Secondary market: 431 million UK Allowances traded (spot and futures contracts, excluding OTC)[2]
6	**China National ETS**	**Start of operation (year):** 2021 **Sectoral coverage:** Power **Cap:** Approximately 4,500 $MtCO_2e$ (2019 and 2020) **Greenhouse gases:** CO_2 **Allowance allocation:** Benchmarking **Offsets and credits:** China Certified Emissions Reductions (CCERs) generated from projects not covered by the national ETS are allowed for up to 5% of their verified emissions **Average allowance price, secondary market price:** Average secondary market price: CNY 55.30 (USD 8.20) **Total revenue:** No information	**Market participation:** Only compliance entities **Primary market:** No auctioning **Secondary market:** Emissions allowances can be traded on a dedicated trading platform managed by the Shanghai Environment and Energy Exchange. OTC is allowed **Legal status:** Allowances are currently not considered as financial instruments **Traded volume:** Secondary market: 51 million allowances traded in 2022, in which over 90% is OTC, raising CNY 2.814 billion (USD 408 billion)[2]
7	**New Zealand ETS**	**Start of operation (year):** 2008 **Sectoral coverage:** Power, Industry, Aviation, Transport, Buildings, Forestry, and Waste **Cap:** 32.2 $MtCO_2e$ (2023) **Greenhouse gases:** CO_2, N_2O, CH_4, SF_6, HFCs, and PFCs **Allowance allocation:** Benchmarking, Auctioning **Offsets and credits:** Offset not permitted **Average allowance price, secondary market price:** Average auction price: NZD 75.88 (USD 48.11) Average secondary market price: NZD 78.97 (USD 50.07) **Total revenue:** NZD 5.1 billion (USD 3.4 billion) since 2008	**Market participation:** Compliance entities, non-compliance entities (domestic and international), and individuals holding an account with the New Zealand ETS Registry **Primary market:** Auctions are operated jointly by New Zealand Exchange and EEX **Secondary market:** New Zealand Units can be traded on a trading platform such as the New Zealand Units. Trades can be on a spot basis or through forward contract. OTC is also possible **Legal status:** Allowances are considered commodities **Traded volume:** Primary market: 26 million New Zealand Units auctioned in 2022[2] Secondary market: 34 million New Zealand Units traded on the exchange in 2022[2]

8	**Korea ETS**	**Start of operation (year):** 2015 **Sectoral coverage:** Power, Industry, Transport. Buildings, Aviation, Waste **Cap:** 589.3 $MtCO_2e$ (2023) **Greenhouse gases:** CO_2 **Greenhouse gases:** CO_2, N_2O, CH_4, SF_6, HFCs, and PFCs **Allowance allocation:** Grandfathering, Benchmarking, Auctioning **Offsets and credits:** Korea Offset Credits and certain international Certified Emission Reductions (CERs) have been allowed since Phase 2 (2018), up to 5% of an entity's compliance obligation **Average allowance price, secondary market price:** Average auction price: KRW 23,243 (USD 17.99) Average secondary market price: KRW 20,633 (USD 15.97) **Total revenue:** KRW 1,092.6 billion (USD 845.2 million) since 2015	**Market participation:** Compliance entities. Limited participation for non-compliance entities **Primary market:** Sectors that receive 100% free allocation are not allowed to participate in auctions. Auctions take place via the Korea Exchange **Secondary market:** Korea Allowance Units, Korea Credit Units, and Korea Offset Credits are traded on the exchange platform managed by the Korea Exchange **Legal status:** Not specified **Traded volume:** Primary market: 14 million Korea Allowance Units auctioned in 2022[2] Secondary market: 25.8 million Korea Allowance Units and Korea Offset Credits traded (exchange and OTC) in 2022[2]
State/ provincial level			
	United States		
9	**California Cap-and-Trade Program**	**Start of operation (year):** 2012 **Sectoral coverage:** Power, Industry, Buildings, Transport **Cap:** 294.1 $MtCO_2e$ (2023) **Greenhouse gases:** CO_2, N_2O, SF_6, HFCs, PFCs, NF_3, and other fluorinated GHGs **Allowance allocation:** Benchmarking, Consignment Auctioning **Offsets and credits:** Offsets, issued by the California Air Resources Board or by the authority of a linked cap-and-trade system, are permitted with limits	**Market participation:** Covered entities, opt-in covered entities, and Voluntarily Associated Entities **Primary market:** Sealed-bid auctions organized jointly with Quebec and administered by WCI, Inc **Secondary market:** Allowance, offsets, and financial derivatives are traded in the secondary market on ICE, the Chicago Mercantile Exchange Group Inc. (CME group), and Nodal Exchange platforms. OTC is possible

		Average allowance price, secondary market price: Average auction price: USD 28.08 **Total revenue:** USD 22.25 billion since 2012	**Legal status:** Allowances are defined as limited tradable authorizations to emit up to one tCO_2e and are not property rights. **Traded volume:** 406.1 million allowances and offsets traded in both California and Québec Cap-and-Trade Programs according to Compliance Instrument Tracking System Service[5]
10	**Regional Greenhouse Gas Initiative** (RGGI) – 11 states including Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Rhode Island, Vermont, Virginia	**Start of operation (year):** 2009 **Sectoral coverage:** Power **Cap:** 88 $MtCO_2e$ (2022) **Greenhouse gases:** CO_2 **Allowance allocation:** Auctioning **Offsets and credits:** Offset types located in RGGI states with a limit of up to 3.3% of an entity's liability **Average allowance price, secondary market price:** Average auction price: 13.46 **Total revenue:** USD 5.9 billion since 2009	**Market participation:** Compliance entities **Primary market:** Regional auctions, managed by Enel X **Secondary market:** The secondary market for RGGI CO_2 allowances comprises the trading of physical allowances and financial derivatives, including futures, forwards, call options, and put options. Financial derivatives are traded on the ICE platform **Legal status:** Allowances are defined as limited tradable authorizations to emit up to one tCO_2e **Traded volume:** 491 million tons of emission allowances traded in 2022[2]
11	**Massachusetts Limits on Emissions from Electricity Generators**	**Start of operation (year):** 2018 **Sectoral coverage:** Power **Cap:** 7.8 $MtCO_2e$ (2023) **Greenhouse gases:** CO_2 **Allowance allocation:** Grandfathering before 2021, Auctioning **Offsets and credits:** Not permitted	**Market participation:** Compliance entities **Primary market:** Sealed bid auctions, managed by Enel X **Secondary market:** Allowances are traded between compliance entities. The Massachusetts Carbon Allowance Registry is used to track the ownership of allowances. Potomac Economics monitors the conduct of market

[5] California Air Resources Board. 2023. Summary of Market Transfers Report, accessed at https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/program-data/summary-market-transfers-report

		Average allowance price, secondary market price: Average auction price: USD 8.17 Average secondary market price: USD 8.10 **Total revenue:** USD 125.2 million since 2018	**Legal status:** Allowances are defined as limited tradable authorizations to emit up to one tCO_2e and are not property rights **Traded volume:** 8 million allowances auctioned in 2022[6]
12	**Washington Cap-and-invest program**	**Start of operation (year):** 2023 **Sectoral coverage:** Power, Industry, Transport, Buildings **Cap:** 63 $MtCO_2e$ (2023) **Greenhouse gases:** CO_2, N_2O, SF_6, HFCs, PFCs, NF_3, and other fluorinated GHGs **Allowance allocation:** Grandfathering, Benchmarking, Free Allocation with Consignment, Auctioning **Offsets and credits:** Offsets from certain projects are allowed up to 5% of an entity's compliance obligation **Average allowance price, secondary market price:** No information **Total revenue:** No information	**Market participation:** Compliance entities, non-compliance entities, and individuals with primary residence in the United States **Primary market:** Auctions are delivered through the Western Climate Initiative, Inc. **Secondary market:** Future contract for allowances on the Nodal Exchange. OTC is possible **Legal status:** Not specified **Traded volume:** 26,859,222 allowances auctioned in 2022, raising USD 1.3 billion[7]
	Canada		
13	**Québec Cap-and-Trade System**	**Start of operation (year):** 2013 **Sectoral coverage:** Power, Industry, Buildings, Transport (Exclude Maritime and Aviation) **Cap:** 52.8 $MtCO_2e$ (2023) **Greenhouse gases:** CO_2, N_2O, CH_4, NF_3, SF_6, HFCs, and PFCs	**Market participation:** Compliance entities, non-compliance entities with an establishment in Canada, and individuals domiciled in Canada **Primary market:** Auctions held jointly with California, administered by the Western Climate Initiative, Inc. **Secondary market:** Exchange trading of allowances and offsets issued by both California and Québec takes place on

[6] Potomac Economics. 2023. Quarterly Report on the Electricity Generator Emissions Limits Program (310 CMR 7.74): Fourth Quarter 2022, accessed at https://www.mass.gov/doc/market-monitor-quarterly-report-2022-q4/download

[7] Calculated by Consultant based on Public Proceeds Reports posted by the Department of Ecology, State of Washington, accessed at https://apps.ecology.wa.gov/publications/UIPages/PublicationList.aspx?IndexTypeName=Topic&NameValue=Cap-and-Invest+%e2%80%94+Market+Reports&DocumentTypeName=Publication

		Allowance allocation: Benchmarking, Auctioning **Offsets and credits:** Offset credits generated in Québec from eligible projects are fungible in the WCI carbon market with limits of up to 8% compliance obligation **Average allowance price, secondary market price:** Average auction settlement price: CAD 36.29 (USD 28.08) **Total revenue:** CAD 7 billion (USD 5.38 billion) since 2013	platforms such as ICE, CME Group or Nodal Exchange. Allowances and offsets are traded through futures and options contracts **Legal status:** Allowances are authorizations to emit up to one tCO_2e to comply with the pertinent regulation and are not financial instruments **Traded volume:** 406.1 million allowances and offsets traded in both California and Québec Cap-and-Trade Programs according to Compliance Instrument Tracking System Service[5]
City level			
	China		
14	**Beijing Pilot ETS**	**Start of operation (year):** 2013 **Sectoral coverage:** Industry, Buildings, Transport **Cap:** Approximately 35 $MtCO_2e$ (2021) **Greenhouse gases:** CO_2 **Allowance allocation:** Grandfathering, Benchmarking, Auctioning **Offsets and credits:** CCERs are allowed up to 5% of the annual allocation **Average allowance price, secondary market price:** Average auction price: CNY 117.54 (USD 17.44) Average secondary market price: CNY 93.32 (USD 13.85) **Total revenue:** CNY 113 million (USD 16.8 million) since 2013	**Market participation:** Compliance entities, domestic non-compliance entities, and domestic individuals that meet the requirements of the carbon emission trading rules **Primary market:** Up to 5% of allowances for regular and irregular auctions **Secondary market:** Trading consists of five spot products: Beijing carbon emission allowances (BEA), CCERs, forest certified emission reductions (FCER), green transport certified emission reductions (PCER), and energy-saving project certified emission reductions. The Beijing Green Exchange manages the trading of all five products. Other products such as forward markets and derivatives are not allowed to be traded **Legal status:** Allowances are not considered financial instruments

			Traded volume: Primary and secondary market: 3.75 million allowances traded in 2022[2]
15	**Chongqing Pilot ETS**	**Start of operation (year):** 2014 **Sectoral coverage:** Industry **Cap:** 78.39 $MtCO_2e$ (2020) **Greenhouse gases:** CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 **Allowance allocation:** Grandfathering, Auctioning **Offsets and credits:** CCERs are allowed for up to 8% of an entity's compliance obligation **Average allowance price, secondary market price:** Average auction price: CNY 28.67/tCO_2 (USD 4.26/tCO_2) Average secondary market price: CNY 39.51/tCO_2 (USD 5.86/tCO_2) **Total revenue:** CNY 335.83 million (USD 49.83 million) since 2014 CNY 79.91 million (USD 11.86 million) in 2022	**Market participation:** Compliance and non-compliance entities and individuals that meet the requirements of the carbon emission trading rules **Primary market:** Auctions **Secondary market:** There is a spot market at Chongqing Carbon Emissions Trading Centre for trading of allowances, CCERs and Chongqing Certified Emissions Reductions (CQCERs) **Legal status:** Allowances are not considered financial instruments **Traded volume:** Primary and secondary market: 4.33 million allowances traded in 2022[2]
16	**Fujian Pilot ETS**	**Start of operation (year):** 2016 **Sectoral coverage:** Industry, Domestic Aviation **Cap:** Approximately 132 $MtCO_2e$ (2021) **Greenhouse gases:** CO_2 **Allowance allocation:** Grandfathering, Benchmarking, Auctioning **Offsets and credits:** CCERs and Fujian Forestry Certified Emission Reduction credits (FFCERs) are allowed. The use of CCERs and both CCERs and FFCERs are limited up to 5% and 10% of the annual allocation, respectively **Average allowance price, secondary market price:** Average secondary market price: CNY 22.74 (USD 3.37)	**Market participation:** Compliance entities and institutional investors (domestic only) that meet the requirements of the emissions trading rules **Primary market:** Ad hoc auctions are organized by Fujian Haixia Equity Exchange **Secondary market:** Spot trading of Fujian Emission Allowances (FJEA), CCERs and FFCERs takes place on Fujian Haixia Equity Exchange **Legal status:** Allowances are not considered financial instruments. **Traded volume:** Primary and secondary market: 7.66 million allowances traded in 2022[2]

		Total revenue: CNY 1.25 million (USD 185,460) since 2016	
17	**Guangdong Pilot ETS**	**Start of operation (year):** 2013 **Sectoral coverage:** Industry, Domestic Aviation **Cap:** 265 $MtCO_2e$ (2021) **Greenhouse gases:** CO_2 **Allowance allocation:** Grandfathering, Benchmarking, Auctioning **Offsets and credits:** The use of CCERs and Tan Pu Hui Certified Emission Reductions (PHCERs) are allowed up to 10% of covered entities' annual emissions **Average allowance price, secondary market price:** Average secondary market price: CNY 76.53 (USD 11.35) **Total revenue:** Approximately CNY 815.5 million (USD 121 million) since 2013	**Market participation:** Compliance entities; domestic and international institutional investors that meet the requirements of the carbon emission trading rules **Primary market:** Ad hoc auctions are organized by the China Emissions Exchange (CEEX) **Secondary market:** Spot trading of Guangdong Emission Allowance (GDEA), CCERs and FFCERs takes place on CEEX **Legal status:** Allowances are not considered financial instruments **Traded volume:** Primary and secondary market: 14.45 million allowances traded in 2022[2]
18	**Hubei Pilot ETS**	**Start of operation (year):** 2014 **Sectoral coverage:** Industry **Cap:** 182 $MtCO_2e$ (2021) **Greenhouse gases:** CO_2 **Allowance allocation:** Grandfathering, Benchmarking, Auctioning **Offsets and credits:** The use of CCERs is allowed up to 10% of covered entities' annual emissions **Average allowance price, secondary market price:** Average auction price: CNY 43.35 (USD 6.43) Average secondary market price: CNY 46.86 (USD 6.95) **Total revenue:** CNY 385.74 million (USD 57.23 million) since 2014	**Market participation:** Compliance entities; domestic and international institutional investors, and individual investors that meet the requirements of the carbon emission trading rules **Primary market:** Ad hoc auctions are organized by China Hubei Emission Exchange **Secondary market:** Spot products include Hubei Emission Allowances (HBEAs) and CCERs, managed by Hubei Emission Exchange **Legal status:** Allowances are not considered financial instruments **Traded volume:** Primary and secondary market: 7.39 million allowances traded in 2022[2]

19	**Shanghai Pilot ETS**	**Start of operation (year):** 2013 **Sectoral coverage:** Industry, Transport, Buildings, Domestic Aviation **Cap:** 109 $MtCO_2e$ (2021) **Greenhouse gases:** CO_2 **Allowance allocation:** Grandfathering, Benchmarking, Auctioning **Offsets and credits:** The use of CCERs is allowed up to 1-5% of covered entities' annual emissions **Average allowance price, secondary market price:** Average auction price: CNY 39.76 (USD 5.90) Average secondary market price: CNY 40.16 (USD 5.96) **Total revenue:** CNY 264.90 million (USD 43.75 million) since 2013	**Market participation:** Compliance entities; non-compliance entities (domestic institutional investors) that meet the requirement of the carbon emission trading rules **Primary market:** Ad hoc auctions **Secondary market:** Products include Shanghai Emission Allowances (SHEAs), Shanghai Emission Allowance Forwards, and CCERs. SHEAs and CCERs are spot products. Shanghai Emission Allowance Forward (SHEAF) is the standardized spot forward product **Legal status:** Allowances are not considered financial instruments. **Traded volume** Primary and secondary market: 3.19 million allowances traded in 2022[2]
20	**Shenzhen Pilot ETS**	**Start of operation (year):** 2013 **Sectoral coverage:** Industry, Transport **Cap:** 25 $MtCO_2e$ (2021) **Greenhouse gases:** CO_2 **Allowance allocation:** Grandfathering, Benchmarking, Auctioning **Offsets and credits:** The use of CCERs, PHCERs, and other offset credits authorized by the local government are allowed up to 20% of covered entities' annual emissions **Average allowance price, secondary market price:** Average auction price: CNY 43.49 (USD 6.45) Average secondary market price: CNY 42.52 (USD 6.31) **Total revenue:** Approximately CNY 27.9 million (USD 4.1 million) since 2013	**Market participation:** Compliance entities; non-compliance entities (institutional investors); individuals (both domestic and international that meet the requirement of the carbon emission trading rule **Primary market:** Only compliance entities and member institutions authorized by the China Emission Exchange (Shenzhen) may participate in auctions **Secondary market:** CCERs, Shenzhen Allowances (SZAs) and local Tan Pu Hui offset credits are the main spot trading products on the China Emissions Exchange (Shenzhen) **Legal status:** Allowances are not considered financial instruments. **Traded volume:** Primary and secondary market: 5.3 million allowances traded in 2022[2]

21	**Tianjin Pilot ETS**	**Start of operation (year):** 2013 **Sectoral coverage:** Industry **Cap:** 75 $MtCO_2e$ (2021) **Greenhouse gases:** CO_2 **Allowance allocation:** Grandfathering, Benchmarking, Auctioning **Offsets and credits:** The use of CCERs, and Tianjin regional forestry offsets are allowed up to 10% of annual compliance obligations **Average allowance price, secondary market price:** Average secondary market price: CNY 34.36 (USD 5.10) **Total revenue:** CNY 148.2 million (USD 22 million) since 2013	**Market participation:** Compliance entities; institutional investors, and individual investors (domestic and international) that meet the requirements of the carbon emission trading rules **Primary market:** Ad hoc auctions organized by Tianjin Climate Exchange **Secondary market:** Products include spot Tianjin carbon emission allowances and spot CCERs, managed by Tianjin Climate Exchange **Legal status:** Allowances are not considered financial instruments. **Traded volume:** Primary and secondary market: 5.45 million allowances traded in 2022[2]

Source: Compiled by the Consultant based on ICAP (2023a), European Commission (2022b, 2022a, 2022c, 2022d), Refinitiv (2023), Lewandrowski and Pauly (2023), ICE Report Center (n.d.), California Air Resources Board (2023b), Department of Ecology, State of Washington (2023b, 2023c, 2023a, 2023d), and Potomac Economics (2023)

II.2. Selection of key criteria, and multi-criteria analysis for selection of case-studies

II.2.1. Selection of key criteria

It would take significant efforts to review and analyze the legal, institutional, and infrastructure requirements for all of the 21 operating CTXs for compliance markets in the world. To effectively assess the international experiences for the establishment and operation of CTXs, the following six criteria were considered as the most important for determining the success of a CTX and for providing meaningful lessons for Viet Nam and thus were used to select the case studies for Viet Nam. The selection of the criteria was based on the consultant's long-standing experience in designing and operating CTX as well as on empirical evidence on the effectiveness of the CTXs.

Criteria A – Years of operation

One of the most important criteria to show the success of a CTX model is its ability to sustain and remain effective over time. Besides, a model that has undergone a sufficiently long operating period of at least more than 5 years will have more experiences to offer for Viet Nam than a newly established one.

Criteria B – Contextual similarity

There is no one-fit-all model for CTXs. The overview of 21 operating CTXs worldwide provided in Table 1 shows a variety of shapes and forms of the CTXs, which have been designed to best suit the context of each country. In order to derive meaningful lessons for Viet Nam, it is important for the selected case studies to have a similar context with Viet Nam. The contextual features include economic status (developed or developing), geography (Asia or non-Asia), and jurisdictional scale (national, supranational, or sub-national). CTXs of developing Asian countries with a nationally scaled ETS would indeed exhibit more similarities to the context of Viet Nam.

Criteria C – Traded volume

The success of a CTX is shown in the active involvement of market participants in the transactions through the exchange. As earlier mentioned, a CTX in its functioning principle would provide a centralized platform for a wider range of participants than other transaction methods (direct, OTC) and would provide sufficient data for market regulation and data analysis. Therefore, the more transactions and the greater the volume of allowances and carbon credits being traded, the more successful the CTX.

Criteria D – Transaction price

A high transaction price does not only show the success of the CTX but also of the ETS itself. As the ultimate purpose of an ETS is to reduce GHG emissions, a high carbon price would provide sufficient incentives for participants in the ETS to engage in GHG mitigation activities and gain benefits from the carbon market. Besides, the price level and volume of the transactions on the platform show the level of trust of the market participants in the CTX.

Criteria E – Use of carbon credits

Not all the operating ETSs, and the CTXs that go along with them, include the use of carbon credits in the system. Given the fact that Viet Nam has more than 300 registered carbon projects and more than 40 million carbon credits issued under different schemes (the Clean Development Mechanism (CDM), the Gold Standard, the Verified Carbon Standard, etc.) (Department of Climate Change, 2022) and is one of the world-biggest country suppliers of carbon credits, the transaction of carbon credits on the CTX would provide benefits for the carbon market in Viet Nam, both for compliance and voluntary purposes.

According to Decree No. 06/2022/ND-CP, facilities can use carbon credits to offset up to 10% of the total allowances. Besides, under the current timeline, the first submission of the GHG inventory results at the facility level in Viet Nam would be on 31 March 2025 for the year 2024 inventory (The Government, 2022b), which might pose difficulties for the CTX to start piloting transactions of allowances in 2025, while carbon credits have already been available in the country since 2006.

The use of carbon credits in the ETS also provides incentives for participants outside the ETS to engage in GHG mitigation actions and gain benefits from the carbon market.

Criteria F – Linking

Viet Nam will consider linking the domestic carbon market with carbon markets in the region and the world from 2028 (The Government, 2022a). Experiences of existing ETSs and CTXs that include linking would be beneficial for Viet Nam in the long run.

II.2.2. Multi-criteria analysis

The different ETSs are assessed by the consultant through a numerical indicator that determines if their CTX model would fulfill each of the above-mentioned criteria in order to provide meaningful lessons for Viet Nam. The criteria are weighted equally given their equal importance for the evaluation. Details about the application of the selected criteria are provided in Annex 1 of this Report.

The summary of the multi-criteria analysis is provided in the table below.

Table 2: Results of multi-criteria analysis for selection of country case-studies

ETS	Criteria						Total score	Ranking
	A- Operation year	**B- Contextual similarity**	**C- Traded volume (allowances)**	**D- Transaction price**	**E- Use of carbon credit**	**F-Linking**		
	2 – More than 10 years **1** – Between 5-10 years **0** – Below 5 years	**Economic status:** **1** – Developing **0** – Developed **Geographical similarity:** **1** – Asia **0** – non-Asia **Jurisdictional similarity:** **1** – nationwide **0** – non-nationwide	**2** – More than 60 million tCO_2 **1** – Between 20-60 million tCO_2 **0** – Below 20 million tCO_2 or no information	**2** – More than USD 50 **1** – Between USD 10-50 **0** – Below USD 10 or no information	**1** – Yes **0** – No	**1** – Yes **0** – No		
EU-ETS	2	0	2	2	0	1	7	**1**
United Kingdom ETS	2	1	2	2	0	0	7	**1**
New Zealand ETS	2	1	2	2	0	0	7	**1**
California ETS	2	0	2	1	1	1	7	**1**
Switzerland ETS	2	1	0	2	0	1	6	**5**
Korea ETS	1	2	1	1	1	0	6	**5**
RGGI	2	0	2	1	1	0	6	**5**
Québec ETS	1	0	2	1	1	1	6	**5**

Kazakhstan ETS	1	3	0	0	1	0	5	**9**
China national ETS	0	3	1	0	1	0	5	**9**
Beijing Pilot ETS	1	2	0	1	1	0	5	**9**
Guangdong Pilot ETS	1	2	0	1	1	0	5	**9**
Germany ETS	0	1	2	1	0	0	4	**13**
Chongqing Pilot ETS	1	2	0	0	1	0	4	**13**
Fujian Pilot ETS	1	2	0	0	1	0	4	**13**
Hubei Pilot ETS	1	2	0	0	1	0	4	**13**
Shanghai Pilot ETS	1	2	0	0	1	0	4	**13**
Shenzhen Pilot ETS	1	2	0	0	1	0	4	**13**
Tianjin Pilot ETS	1	2	0	0	1	0	4	**13**
Washington ETS	0	0	1	0	1	0	2	**20**
Massachusetts ETS	1	0	0	0	0	0	1	**21**

Source: The Consultant (2023)

The results of the multi-criteria analysis showed 8 ETSs having the first and the second highest score. Among the first-ranking groups, the United Kingdom ETS (UK ETS) is similar to the EU ETS. Given its country-based, the UK ETS is deemed to offer more relevant lessons for Viet Nam. Therefore, it is selected for further analysis together with the New Zealand ETS (NZ ETS) and the California ETS. The NZ ETS is an interesting case study as it covers a wide range of sectors including forestry. The California ETS can offer lessons for linking with Québec ETS. Among the second-ranking group, the Korea ETS was selected to take the place of the EU ETS due to its unique location feature as the only long-established and successful ETS in Asia and the use of both domestic and international carbon credits for offsets.

Therefore, in total, four case studies were selected for further analysis, including the UK, New Zealand, California, and Korea. The following sections analyze the legal, institutional, and infrastructure for CTX in these case studies. Some introductory features of the ETSs were also discussed as relevant to the establishment and operation of the CTX.

II.3. Assessment of legal, institutional, and infrastructure requirements for CTX in the selected case studies

The following section provides the assessment of the legal, institutional, and infrastructure requirements for CTXs in the four case studies selected above.

II.3.1. The United Kingdom ETS

II.3.1.1. Overview of the United Kingdom ETS

The current UK ETS commenced in 2021, following the Brexit of the UK from the EU ETS, and is considered one of the key climate policy tools for the UK to achieve the net-zero emission target by 2050.

The scope of UK ETS is compatible with the EU ETS for sectors and GHGs covered to ensure a smooth transition for participants when the UK left the EU.

- Covered sectors: power, energy-intensive industries, and aviation;
- Covered gases: CO_2, nitrous oxide (N_2O), and perfluorocarbons (PFCs) from certain industrial processes

The UK ETS plans to expand to the domestic maritime sector from 2026 and the waste sector from 2028. Currently, the UK ETS covers a quarter of UK emissions (108 $MtCO_2e$ in 2021). The cap was initially set at 5% below the UK's notional share of the EU ETS cap for its fourth phase. From 2024, the cap will be reset to be in line with the net-zero target (Erik Hesketh, 2023).

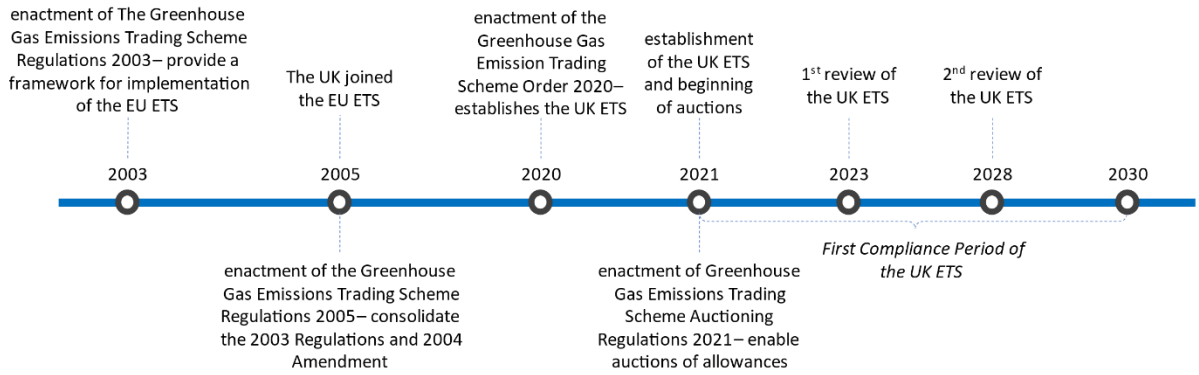

Figure 3: The UK ETS Implementation Progress

Source: Compiled by the Consultant based on the Greenhouse Gas Emissions Trading Scheme Regulations (2003, 2005), the Greenhouse Gas Emissions Trading Scheme Order (2020), and the Greenhouse Gas Emissions Trading Scheme Auctioning Regulation (2021)

In the UK ETS, auctioning serves as the primary method for distributing allowances. Participants have the opportunity to acquire allowances through auctions, as well as engage in trading on the secondary market. Additionally, a portion of allowances, approximately 58 million allowances in 2021 (equivalent to around 37% of the 2021 cap), is allocated for free to industrial participants deemed at risk of carbon leakage. This allocation decreases annually by 1.6 million allowances.

Companies shall monitor and report their emissions accurately to an official authority, and have their reports verified by an independent party. They shall surrender allowances equal to their emissions over a scheme year. Companies carrying out activities covered under the UK ETS must hold a GHG emissions permit (installations) or an emissions monitoring plan (aircraft operators), issued by the scheme's regulators.

Allowance transactions among UK ETS participants are tracked through a registry. Safeguards are in place to help minimize the risk of fraud and manipulation that comes with the financial value of the allowances.

Current UK ETS is in the first compliance period, up until 2030 with about 1,000 entities from the power, industrial, and aviation sectors (ICAP, 2023c).

II.3.1.2. Legal basis

The first legal document to establish emission trading in the UK was the Greenhouse Gas Emissions Trading Scheme Regulations 2003 which was then replaced by the Greenhouse Gas Emissions Trading Scheme Regulations 2005 when the UK participated in the EU ETS. Following different revisions and amendments, the current UK ETS was established pursuant to the Greenhouse Gas Emissions Trading Scheme Order 2020.

The Order includes nine parts with 77 articles, and 11 schedules to provide further details for some of the articles. The most important parts include the basic elements of the UK ETS (establishment, allowances and caps, monitoring reporting and verification), specific requirements for installations and aviation, charging, monitoring compliance, and enforcement.

As part of the establishment of the UK ETS, the Greenhouse Gas Emissions Trading Scheme Order 2020 also mandates a periodic review of the UK ETS by the UK ETS Authority. In the First Compliance Period of the UK ETS (2021- 2030), Article 17 (2) requires the reviews of the UK ETS to be conducted by 31 December 2023 and 31 December 2028 respectively, with a report published to set out the conclusions of the review.

The review report must provide (a) the review of the operation of the UK ETS (including assessing the extent to which the purpose of the UK ETS is being achieved), and (b) make any recommendations that the UK ETS Authority considers appropriate as to the future operation and purpose of the UK ETS.

Legal Designation of the Emissions Exchange

There is no specific article in the Greenhouse Gas Emissions Trading Scheme Order 2020 mentioning the establishment of a CTX. Chapter 2 of the Order, however, states that "allowances can be traded, except where prohibited by other legislation". Furthermore, the carbon price for 2021 is determined by the auction clearing price, whereas for 2022 and subsequent years, it is based on the average of the settlement price "as traded on the relevant carbon market exchange."

The Greenhouse Gas Emissions Trading Scheme Auctioning Regulations 2021 later specifies that "auctions may only be conducted on an auction platform which is: (a) recognized auction platform; and (b) authorized as a recognized investment exchange whose operator organizes a secondary market in allowances or allowances derivatives". The Regulations further specify that "recognized investment exchange" means an investment exchange recognized under the Financial Services and Markets Act 2000 but "does not include an oversea investment exchange".

Traded commodities in the UK ETS

In the primary market, UK Allowances (UKAs) are allocated via auctioning, pursuant to the Greenhouse Gas Emissions Trading Scheme Auctioning Regulations 2021 (SI 2021/484). The auctions are conducted fortnightly, with the dates and the number of UKAs being auctioned off set out in the auction calendar. The auctions are managed by ICE Futures, and therefore UK ETS participants wishing to take part in the auctions must register as bidders with ICE Futures. The execution of any successful bid from the primary market, along with the trading of UK Allowances (UKAs) in the secondary market, is exclusively conducted within the registry operated by ICE Futures.

While the UK ETS does not currently allow for any offsets to be surrendered in place of a UKA, there have been considerations regarding the interplay between the UK ETS and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), given that the UK ETS covers the aviation sector. Initially, the UK government had targeted the implementation of CORSIA offsetting in the UK ETS to commence in 2022, but as a result of COVID-19, the UK government plans to have all legislation for CORSIA and any consequential amendments that may be required for the UK ETS to be in force by the start of 2024.

Additionally, the UK government is presently contemplating the incorporation of GHG removals within the UK ETS for compliance purposes. A call for evidence on this matter concluded in June 2022.

Banking of allowances is permitted and there are limited and implicit provisions for borrowing allowances as well. UKAs remain valid in future years of the scheme and allowances allocated for free in the current year are allowed to be used for compliance in the previous year. However, covered entities are not allowed to use surplus allowances from the EU ETS for compliance with the UK ETS (ICAP, 2023c).

As for the legal status of allowances, the Recognized Auction Platforms (Amendment and Miscellaneous Provisions Regulation 2021) Affirmative Statutory Instrument established UKAs as financial instruments.

Operation of the Emissions Market

The UK ETS was designed to mirror the EU ETS obligations that UK compliance entities had prior to Brexit. Phase 1 commenced on 01 January 2021 upon the departure of the UK from the European Union and is subdivided into Phase 1(a) covering the first three years (2021-2023) and Phase 1(b) covering from 2023 to 2027.

Key development from Phase 1(a) to Phase 1(b) is the early phase out of free allocation for the aviation sector from 2026. This was announced as part of the reforms to align the UK ETS with the UK's net zero target. Further, from Phase 1(b) onwards, as part of the phase-out of the aviation sector's free allocation, the entitlement of aviation free allocation will be decreased annually at a fixed rate of 2.2% in both 2024 and 2025, before transitioning into a full auctioning in 2026. Additionally, the free allocation entitlement for aircraft operators will also be capped at a maximum entitlement of 100% verified emissions, and surplus free allocated entitlements will be returned to the UK ETS Authority.

The UK ETS received a total revenue of GBP 6.1 billion (USD 7.6 billion) in 2022. Revenues from UK ETS auctions accrue to the general budget and are not earmarked.

The following figure describes the price development of the UK ETS (including the period under the EU ETS).

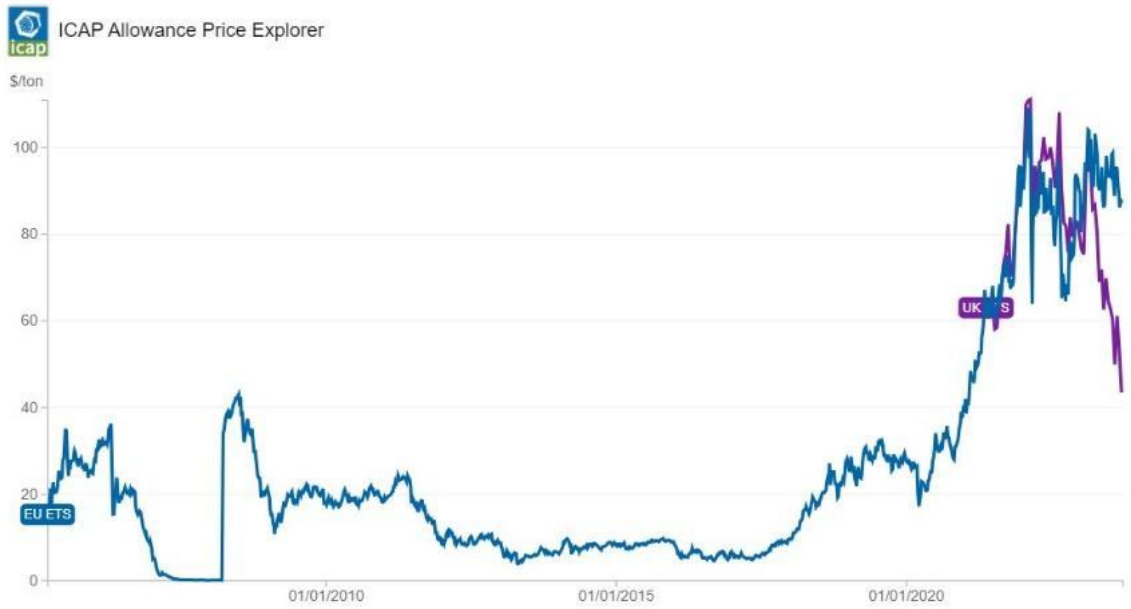

Figure 4: Price development of the UK ETS over time

Source: ICAP (2023)

UK ETS registry

The establishment and operation of the registry of the current EK ETS is provided in Schedule 5A of the Greenhouse Gas Emissions Trading Scheme Order 2020. Accordingly, the registry is an electronic system to keep track of:

- Operators of installation and aircraft operators participating in the UK ETS;
- UKAs held by persons and the allocation and transfer of UKAs;
- Reportable emissions of installations and aviation emissions of aircraft operators;
- Surrender of UKAs by operators and aircraft operators.

According to the Order, the registry is established to allow for the following types of accounts for holding allowances:

- Central accounts;
- An auction delivery account;
- Operator holding accounts;
- Aircraft operator holding accounts;
- Trading accounts.

Individuals appointed as authorized representatives for accounts will have access to the registry to perform actions in relation to accounts on behalf of account holders.

Market monitoring and oversight

At the national level, the UK ETS is regulated by the UK ETS Authority, made up of the UK government, the Scottish government, the Welsh government, and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland collectively. The UK ETS Authority is responsible for the enforcement of compliance with the UK ETS regulations,

including operational functions such as issuing and ensuring compliance with permits (for installations) and emission plans (for aviation).

At the platform level, oversight in the UK ETS is also covered by the Recognized Auction Platforms (Amendment and Miscellaneous Provisions Regulations 2021) Affirmative Statutory Instrument, which states that carbon allowances under the UK ETS are considered "financial instruments". This means that rules applicable to financial market products, including OTC purchases or trading of UKAs derivatives, also apply to the spot segment of the secondary carbon market. Oversight of the UKAs is also covered by the Greenhouse Gas Emissions Trading Scheme Auctioning Regulations 2021 (SI 2021/484) where the institutional requirements for allocation via auctioning are laid out.

At the compliance entity level, in terms of surrendering compliance allowances, the various regulators for each UK nation, as part of the UK ETS Authority, are responsible for monitoring compliance and taking any necessary enforcement action. Regulated entities that fail to surrender a permit for each tCO_2e emitted are subject to an excess emission penalty, which is equal to GBP 100 per tCO_2e initially but adjusted for inflation over time.

Market stability mechanism

The UK ETS Authority will maintain a vigilant watch over all UK ETS markets, collaborating with their regulatory and operational counterparts to guarantee a comprehensive understanding of their operations (Department for Business, Energy & Industrial Strategy & Department for Energy Security & Net Zero, 2023b). A comprehensive market monitoring framework is in place to track registry holdings, auction outcomes, secondary market reporting, and any potential impact of the UK ETS on other markets. To prevent market instability during the UK ETS's initial phase, the system incorporates two crucial safeguard mechanisms: the Auction Reserve Price (ARP) and the Cost Containment Mechanism (CCM). Both ARP and CCM are regulated under the Greenhouse Gas Emissions Trading Scheme Auctioning Regulations 2021.

The ARP sets a price floor or a minimum price of GBP 22 per ton of CO_2e for allowances sold in the UK ETS auctions to ensure a stable market during the transition phase (Department for Business, Energy & Industrial Strategy & Department for Energy Security & Net Zero, 2023b).

The CCM aims to alleviate the impact of prolonged price spikes. The CCM will be triggered where the monthly average carbon price is more than 2, 2.5, or 3 times the 2-year average carbon price for 3 consecutive months if the last consecutive month is in 2021, 2022, or 2023, respectively. If the CCM is triggered, the Authority will consider the most appropriate interventions given the market context and will implement them in a timely manner. The interventions can include:

1. Adjusting allowance distribution within the current year's auctions
2. Raising the auction volume for carbon allowances by:
    - Accelerating the auction of allowances from future years;

- Trigger market stability mechanism to release UKAs from this account;
- Auctioning up to 25% of the remaining allowances in the New Entrants' Reserve;
- Auctioning unutilized UKAs that were previously allocated for free to stationary installations in the current or past scheme years when the free allocation volume is below the industry cap;
- Transferring UKAs from the flexible share into the auctions.

The CCM was triggered in the UK ETS for both December 2021 and January 2022. However, on both occasions, the UK ETS Authority had decided not to intervene.

Supply Adjustment Mechanism

Currently, the UK ETS Authority has set out the possibility of establishing a Supply Adjustment Mechanism. This could be based on the EU ETS Market Stability Reserve, but the UK ETS Authority will consult on the design of the Supply Adjustment Mechanism in due course.

Inter-linkages with other ETS

Currently, the UK ETS is not linked to any other systems, but the UK government remains open to the possibility of linking if such a link is advantageous.

II.3.1.3. Institutional set-up

The institutional framework for the UK ETS involves various stakeholders, including:

The UK ETS Authority

The UK ETS Authority comprises the UK, Scottish, and Welsh Governments and the Northern Ireland Department of Agriculture, Environment and Rural Affairs. They are responsible for the regulation of the UK ETS, including issuing civil penalties for non-compliance with GHG emissions permits and reviewing and reporting on the operation of the UK ETS (The Greenhouse Gas Emissions Trading Scheme Order 2020, 2020).

The UK ETS Regulators

The UK ETS Regulators are responsible for overseeing the UK ETS (Department for Business, Energy & Industrial Strategy & Department for Energy Security & Net Zero, 2023a; Greenhouse Gas Emissions Trading Scheme Order 2020, 2020). The UK ETS Regulators include the UK Environment Agency (UKEA), the Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW), the Northern Ireland Environment Agency (NIEA), and the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED). Each regulator will regulate installations and aircraft operators located or registered in the respective territory or territorial sea under the administrative control of the regulator. Their responsibilities include issuing permits and emissions monitoring plans, monitoring emissions, and taking enforcement action against non-compliant participants. Each regulator is also a registry administrator.

The UK Emissions Trading Registry

The UK Emissions Trading Registry administered by the UKEA, acts as a bank for the UKAs and Kyoto Protocol international units (Department for Business, Energy & Industrial Strategy & Department for Energy Security & Net Zero, 2023a). It records annual verified emissions, holding of UKAs in accounts, UKAs transfer and surrender, and matters relating to the free allocation of UKAs.

Auctioneer

The Auctioneer as defined in the Auctioning Regulations 2021, is responsible for the arrangements of UKA auctions, receiving and paying the auction proceeds (Greenhouse Gas Emissions Trading Scheme Auctioning Regulations 2021, 2021). Without an auctioneer appointed, no UKAs may be auctioned. At the moment, the Department for Business, Energy & Industrial Strategy has been appointed by the Treasury as the UK Auctioneer (Department for Energy Security & Net Zero, 2023a).

ICE Futures Europe

ICE Futures Europe hosts UK ETS Auctions and provides secondary market services. ICE Futures Europe is responsible for determining the auction clearing price (Department for Business, Energy & Industrial Strategy & Department for Energy Security & Net Zero, 2023b).

UK Accreditation Service

UK Accreditation Service is responsible for the accreditation and supervision of verifiers in the UK and for maintaining a list of those verifiers (Department for Business, Energy & Industrial Strategy & Department for Energy Security & Net Zero, 2023a).

Participants

According to the Greenhouse Gas Emissions Trading Scheme Order 2020, compliance entities covered under the UK ETS are divided into two categories: installations and aircraft operators (Greenhouse Gas Emissions Trading Scheme Order 2020, 2020). Installations under the UK ETS are facilities that carry out regulated activities that emit GHG emissions, including combustion of fuels with a total rated thermal input exceeding 20 MW (except municipal or hazardous waste incineration) and industrial production. While hospitals, small emitters (installations with emissions lower than 25,000 tCO_2e per annum and with rated thermal capacity below 35 MW), and ultra-small emitters (installations with maximum emissions of 2500 tCO_2e) are subjected to simplified provisions (Department for Business, Energy & Industrial Strategy & Department for Energy Security & Net Zero, 2023a) and to emission targets rather than having UKA surrender obligations. Under aviation, the UK ETS covers routes for UK domestic flights, flights to Switzerland, and flights departing from the UK to the European Economic Area.

To engage in activities covered by the UK ETS, it is required to obtain a GHG permit, a hospital or small emitter permit (applicable to installation operators), or an emissions monitoring plan (applicable to aircraft operators) (Department for Business, Energy & Industrial Strategy & Department for Energy Security & Net Zero, 2023a). Permits and

emissions monitoring plans are issued by the UK ETS Regulators. A GHG permit holder or an emission monitoring plan holder must comply with the following requirements (Department for Energy Security & Net Zero, 2023b):

- Monitor emissions;
- Submit emissions report, verification report, and improvement report (if applicable);
- Surrender UKAs; and
- Notify regulators of relevant changes to the monitoring plan.

The figure below shows annual compliance obligation deadlines for the UK ETS participants.

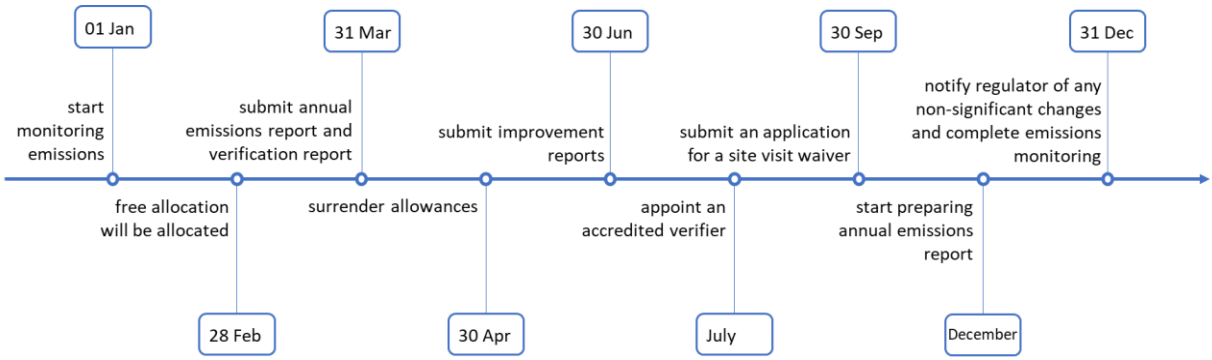

Figure 5: Important dates for tasks and compliance for the UK ETS participants

Source: Compiled by the Consultant based on the Department for Energy (2023b)

The UK ETS market participants include not only compliance entities but also non-compliance entities and individuals (Department for Energy Security & Net Zero, 2023a). Auctions of UK allowances are accessible to both UK and non-UK investment firms and credit institutions. Participation from entities with permissions under Part 4A of the Financial Services and Markets Act (FSMA) necessitates authorization under either the Markets in Financial Instruments Directive (MiFID) or the Capital Requirements Directive (CRD). Additionally, eligible individuals with a registered office in the UK are also permitted to participate in these auctions. In order to participate in the auction, they will need an account in the UK Emissions Trading Registry. Participants can also trade allowances on the secondary market also hosted by ICE.

The figure below illustrates the institutional arrangements for the UK ETS.

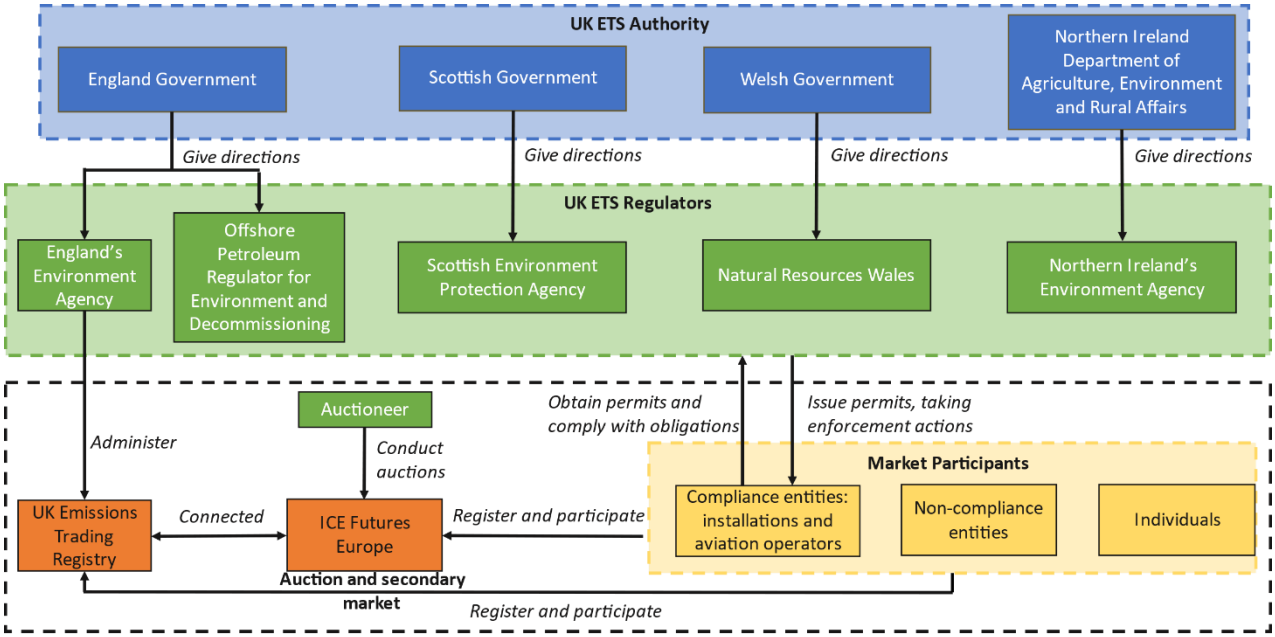

Figure 6: Institutional arrangements of the UK ETS

Source: Compiled by the Consultant (2023)

II.3.1.4. Infrastructure

The trading of UK allowances is facilitated through the UK Emissions Trading Registry. The Registry is a secure web-based application that serves as both the UK Emissions Trading Scheme Registry holding UKAs and the UK Kyoto Protocol Registry holding international units. The types of accounts for market participants in this Registry include Operator Holding Account (OHA), Aircraft Operator Holding Account (AOHA), Trading Account, and Person Holding Account. Details of these types of accounts are demonstrated in the Table below.

Table 3: Account types in the UK Emissions Trading Registry

Account Type	Description
Operator Holding Account (OHA)	Required for installation operators to manage acquisition and surrender of allowances in alignment with UK ETS obligations. Also utilized for trading allowances
Aircraft Operator Holding Account (AOHA)	Mandatory for aircraft operators, facilitating compliance-related activities within the UK ETS framework. Also utilized for trading UKAs
Trading Account	Solely designated for the holding and trading of UKAs. Cannot be utilized to fulfill UK ETS compliance obligations
Person Holding Account	Facilitates access within the UK Kyoto Protocol Registry. Offered for individuals necessitating the holding or trading of international units alongside functionalities within the UK ETS

Source: Compiled by the Consultant based on the Department for Business, Energy & Industrial Strategy and Department for Energy Security & Net Zero, (n.d.)

Within the UK ETS, the utilization of offsets for compliance is not currently allowed (ICAP, n.d.-c). Thus, the following section will focus on two critical elements: (i) Infrastructure required for auctions; and (ii) Infrastructure required for trading in the secondary market.

The infrastructure required for auctions

ICE Futures Europe currently administers the auction platform under the UK ETS. To engage in auctions, participants must open a UK ETS Trading Account or utilize their existing OHA or AOHA if already holding a UK ETS Permit or Monitoring Plan (Department for Energy Security & Net Zero, 2023a). Besides, all participants must apply for admission to auctions and have an arrangement in place with an Exchange Member, an Auction-only Access Provider, or directly to the Exchange (ICE Futures Europe, n.d.). The auctions will take place on WebICE, ICE's front-end trading platform. During the bidding window, bidders may enter, withdraw, and amend bids and cannot view the bids of other participants. ICE Futures Europe will review the submitted bids and establish the auction clearing price by ranking total bid quantities in descending order of bid price. Successful bidders are required to remit full payment to ICE Clear Europe on the day following the auction. Upon payment receipt, ICE Clear Europe initiates the transfer of UKAs from its registry account to the registry accounts of the successful bidders (ICE Futures Europe, n.d.). Overall, the infrastructure required for the UKAs auction is demonstrated in the figure below.

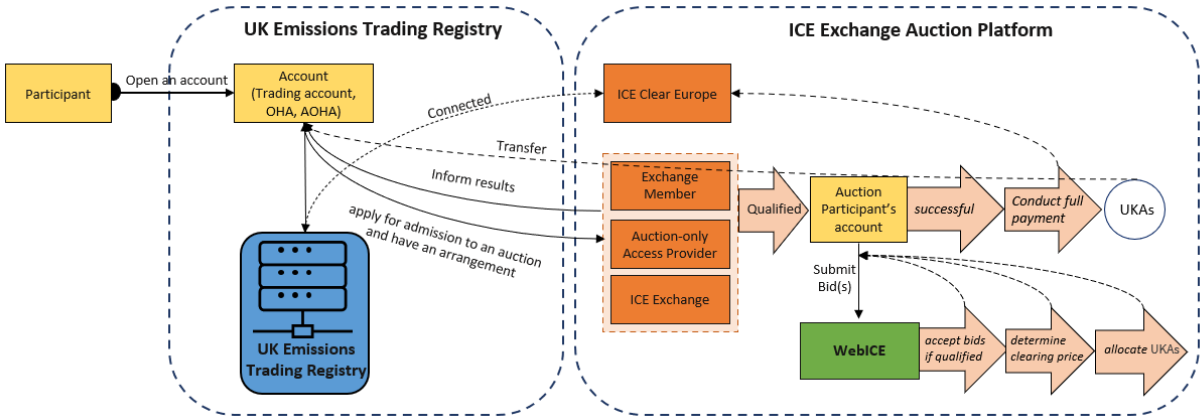

Figure 7: Infrastructure required for auctioning of UK Allowances in the UK ETS

Source: Compiled by the Consultant based on ICE Futures Europe (n.d.)

Infrastructure required for trading in the secondary market

Trading within the UK ETS secondary market occurs via ICE Futures Europe. Participants can engage through exchange-based trading or an OTC transaction. OHA, AOHA, and Trading Accounts within the UK Emissions Trading Registry are eligible for secondary market trading (Department for Energy Security & Net Zero, 2023a).

For OTC transactions, buyers and sellers can transfer UKAs within the UK Emissions Trading Registry. In trades through ICE Futures Europe, UKAs are physically transferred from a valid account of the selling clearing member at the UK Emissions Trading Registry to the specified account of ICE Clear Europe at the UK Emissions Trading Registry, subsequently, from ICE Clear Europe's account to a valid account of the buying clearing member at the UK Emissions Trading Registry. All trades are backed by ICE Clear Europe as the central counterparty, and the clearing process is managed in ICE Clear Europe. The Figure below shows the infrastructure required for trading in secondary markets in UK ETS.

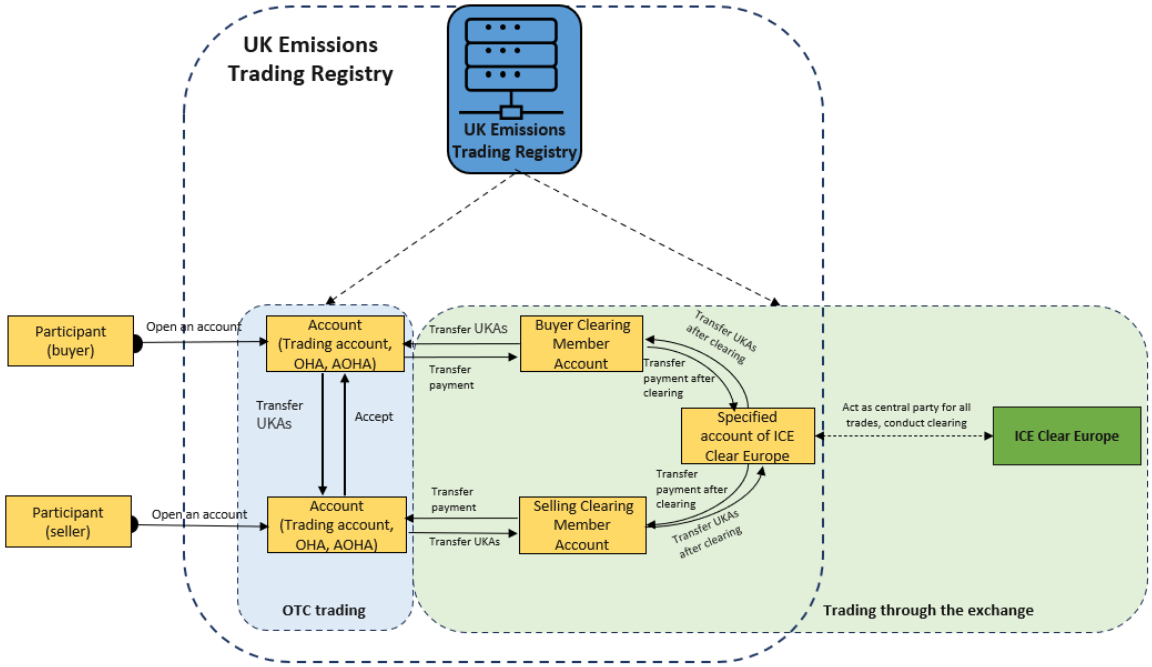

Figure 8: Infrastructure required for trading in the secondary market in the UK ETS

Source: Compiled by the Consultant based on the Department for Energy Security & Net Zero (2023a)

Besides, compliance entities use their OHAs to surrender UKAs in line with their UK ETS obligations. Overall, the infrastructure of the CTX's formulation in the UK ETS is demonstrated below:

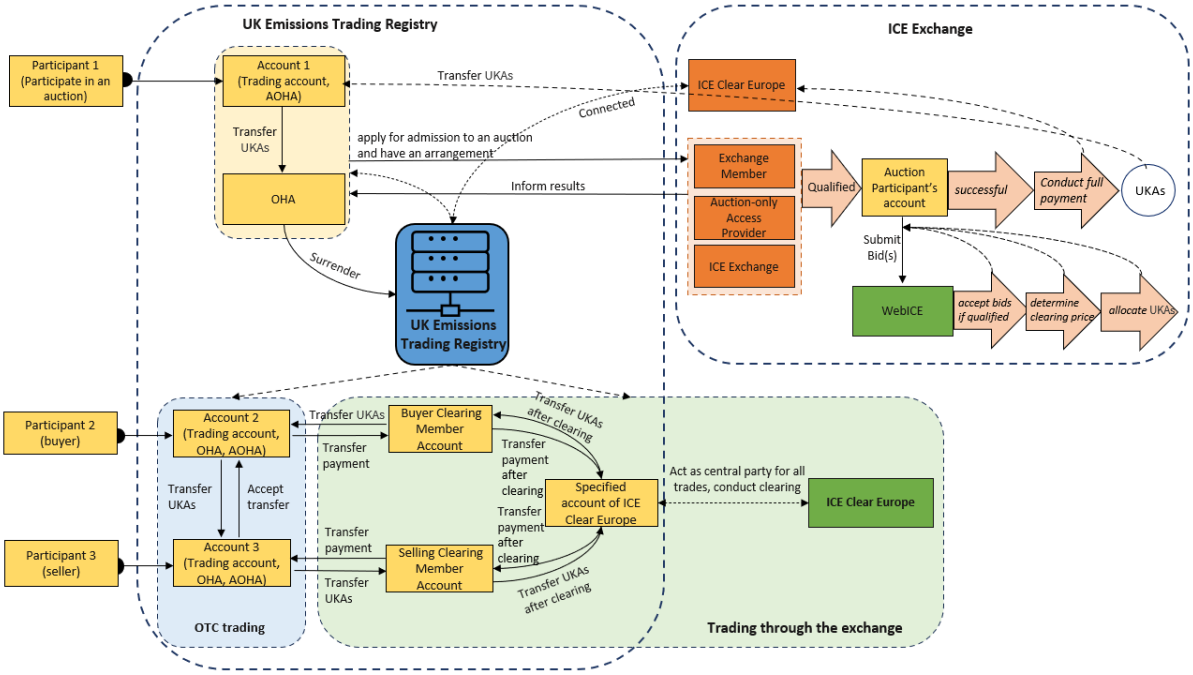

Figure 9: Overall CTX infrastructure in the UK ETS

Source: Compiled by the Consultant (2023)

II.3.1.5. Implementation challenges and solutions

Before Brexit, the UK was part of the EU ETS and thus underwent challenges that the EU faced during the period which included the following (Kara Anderso, 2024):

- Carbon price volatility: there were periods where the price of carbon was too low to effectively incentivize reductions in emissions (see **Error! Reference source not found.**). This volatility can undermine the system's goal of providing a stable economic incentive for companies to invest in low-carbon technologies;
- Over-allocation of allowances: the initial phase of the EU ETS faced criticism over the way emission allowances were allocated. Many allowances were given for free, which led to windfall profits for some companies without significant reductions in emissions;
- Carbon leakage: carbon leakage is a concern where companies might relocate production to countries with more relaxed emission constraints to avoid the costs associated with buying allowances. This not only determines the emission reduction efforts but also impacts the competitiveness of businesses.

Learning the experiences from the EU ETS, the UK therefore adopted measures to address the challenges from the beginning of the implementation of the UK ETS after Brexit, including:

- Use of auction as the primary method for allocation of allowances to avoid windfall profits for covered- entities;
- Adoption of auction reserve price and cost containment mechanism (and possibly market stability reserve like the EU ETS) to address carbon price volatility;
- Introduction of a Carbon Border Adjustment Mechanism (CBAM) similar to the EU to avoid carbon leakage.

II.3.2. The New Zealand ETS

II.3.2.1. Overview of the New Zealand ETS

Commencing in 2008, the NZ ETS was set up by the Climate Change Response Act 2002 which is the legislative framework and incorporates all of New Zealand's key climate change legislation.

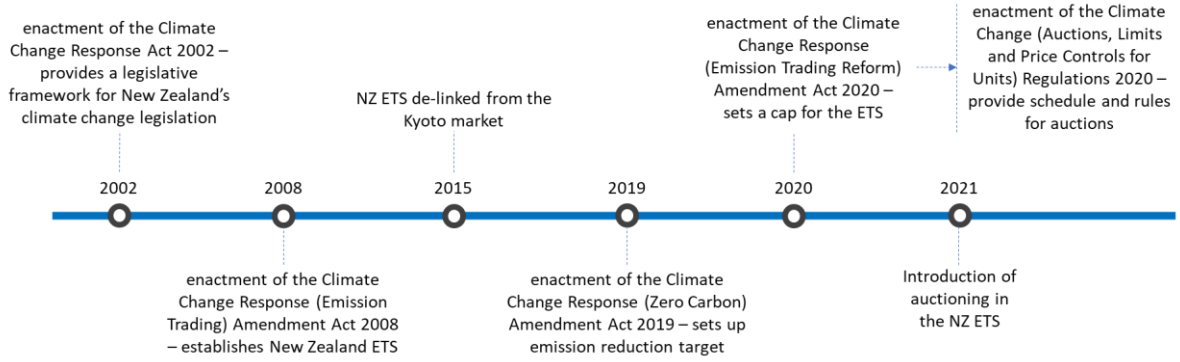

Figure 10: The UK ETS Implementation Progress

Source: Compiled by the Consultant based on New Zealand's Ministry for the Environment (2022)

The NZ ETS covers all sectors of New Zealand's economy, namely forestry, stationary energy, industrial processes, liquid fossil fuels, waste, synthetic gases, and agriculture. The NZ ETS covers about 50% of New Zealand's GHG emissions with approximately 2,887 entities with either reporting and/ or surrender obligations (ICAP, 2023b).

In terms of targets, the Climate Change Response (Zero Carbon) Amendment Act 2019 states that New Zealand aims for a 50% reduction of net emissions below gross 2005 levels by 2030, and a 10% reduction of biogenic methane emissions below 2017 levels. Further, it aims to reduce net emissions of all GHGs (excluding biogenic methane) to zero, along with 24-47% for biogenic methane emissions below 2017 levels by 2050.

The cap includes the number of allowances for auctioning, free allocation to emissions-intensive and trade-exposed (EITE) activities, and the Cost Containment Reserve (CCR). Free allocation is provided, based on output- and intensity-based benchmarks. However industrial free allocation is being phased down with a minimum annual rate of 1% from 2021-2030 and the rate will increase to 2% and 3% for the years 2031-2040 and 2041-2050, respectively. Auctioning was introduced in the NZ ETS in 2021 (ICAP, 2023b).

ETS participants shall submit an Annual Emission Return (emission report) by the end of March, following a system of self-reporting supplemented by a compliance review of the government. Third-party verification is only required if they use an emissions factor different from the default one supplied by the government (ICAP, 2023b).

There are no phases or different compliance periods in the NZ ETS. Rather, the New Zealand government decides the supply of New Zealand Units (NZUs) for 5 years in advance and they are extended by one year annually.

The transaction of NZUs is registered on the unit register in the Registry. The NZ ETS allows banking but not borrowing. The fine is applied to entities that fail to submit an emission report by the due date or to surrender or repay emission units, among other types of infringement (ICAP, 2023b).

II.3.2.2. Legal basis

The establishment of the NZ ETS was based on Part 4 of the Climate Change Response (Emission Trading) Amendment Act in 2008, which includes general provisions and sector-specific provisions for the operation of the ETS. Further amendments were made in 2009, 2011, and 2020. The Climate Change Response (Emissions Trading Reform) Amendment Act in 2020 requires the New Zealand government to set a cap on emissions covered by the NZ ETS, based on the five-year emission budgets mandated by the Climate Change Response (Zero Carbon) Amendment Act 2019.

In a consultation paper in 2022, the Ministry of Environment invited feedback on whether to regulate the NZU based on existing financial markets legislation, regulating NZU financial advice, transactional and custodial services, transaction reporting, and applying the anti-money laundering and Counter Financing of Terrorism Act 2009 Framework. By doing so, the proposal is to treat the NZU as a financial product and to appoint the Financial Markets Authority to oversee and regulate the NZU market.

The Climate Change Response Act 2022 originally requires statutory independent reviews of the operation and effectiveness of the NZ ETS every five years. The first and the second ones took place in 2011-2012 and 2015-2017, respectively.

Legal Designation of the Emissions Exchange

Currently, the New Zealand Exchange (NZX) in partnership with the European Energy Exchange (EEX) manages the NZ ETS Auctions. The functioning of the auction on the NZX is dictated by the Climate Change (Auctions, Limits and Price Controls for Units) Regulations 2020 (the NZ Auctions Regulations). Under Article 5 of the NZ Auctions Regulations, the sales of NZUs by auction commenced on 17 March 2021, with the cumulative volumes of NZUs available for sale in each calendar year made available.

As part of the discussion document published in November 2022 by the New Zealand Ministry of Environment on market governance of the NZ ETS, there has been an in-principal agreement to develop an optional centralized exchange for the secondary market. Currently, the government is considering several options to procure and fund a licensed market operator to run the NZU market platform. In doing so, the NZU market platform would be considered a financial product market, which under the Financial Market Conduct Act, is a facility where financial products are bought or sold, or where offers or invitations to buy or sell financial products are made. The view of the Ministry of Environment is that the licensing of NZU trading facilities that meet the definition of a financial product market would help to provide greater oversight of the trading activity on secondary markets generally, as well as help to detect and deter insider trading and market manipulation. Another reason for doing so is that it is beneficial to develop a

centralized clearing and settlement arrangement to handle the transfer of payments and NZUs in a similar manner to financial markets. Hence, it will help to mitigate credit and counterparty risks and improve oversight of price, volumes, and trading activity on the secondary market.

Traded commodities in the NZ ETS

Under the NZ ETS, a NZU is created either through the free allocation from the government, or the creation of a NZU through carbon removal.

The free allocation is provided by the New Zealand government, based on output and intensity-based benchmarks, for 26 eligible industrial activities. Currently, the Climate Change Response Act 2002 sets out the criteria for industrial allocation.

Initially, the NZ ETS was fundamentally conceived as an internationally linked ETS, designed to link with the Kyoto Protocol. Units from CDM were eligible for use in the NZ ETS without restrictions. However, this left the NZ ETS exposed to the decline in prices in CDM, and in 2015, it became ineligible to surrender CERs for compliance under the NZ ETS.

In terms of carbon credits, the NZ ETS allows for the development of NZUs through domestic removal activities. Eligible removal activities are set out in Schedule 4, Part 2 of the Climate Change Response Act 2002, and include forestry and non-forestry activities. For forestry removal activities, NZ ETS participants are entitled to receive one NZU per tCO_2e removed for registered post-1989 forest land. Other eligible activities include:

- Embedding global warming gases in a product;
- Storing CO_2 after capture;
- Exporting liquefied petroleum gas;
- Exporting or destroying bulk synthetic GHG;
- Exporting synthetic GHGs such as hydrofluorocarbon (HFC) or perfluorocarbon (PFC) in pre-charged equipment or motor vehicles; and
- Destroying synthetic GHGs such as HFC or PFC in New Zealand.

The Climate Change (Other Removal Activities) Regulations 2009 outline the thresholds for eligibility to register as a participant. Currently, there is no quantitative limit set on NZUs generated from removal activities. Recently, the New Zealand government announced that it would review the NZ ETS and the use of forestry to offset carbon emissions because of concerns that the current process may not boost emission reductions. Separately, there are considerations on whether they should allow access to high-integrity international carbon markets as part of the NZ ETS to meet its 2030 target.

Operation of the Emissions Market

The NZ ETS was enacted to cover all economic sectors and major GHGs over time. Under the Climate Change Response Act 2002, the NZ ETS had the dual purpose of assisting the New Zealand government to meet its international obligations under the Kyoto Protocol

and the Paris Agreement and to support New Zealand in meeting its 2050 emission reduction target and emission budgets.

Instead of operating in various phases, the NZ ETS functions on a five-year rolling basis, where the New Zealand government decides the amount of NZUs supplied for five years in advance and they are extended each year. The rolling process in terms of determining the supply of NZUs is depicted in the figure below.

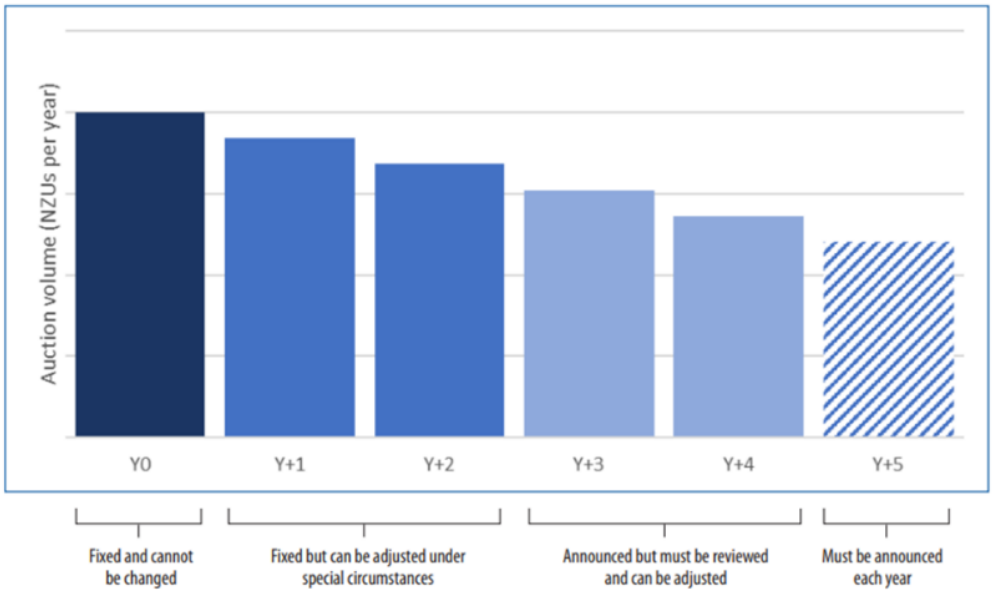

Figure 11: Five-year rolling process for setting supply of NZU

Source: Leining (2022)

In 2022, 19.3 million of NZUs were auctioned. Total revenue from the NZ ETS since the beginning was about USD 3.4 billion, of which USD 1.3 was in 2022. The revenue from the NZ ETS is administered by the Climate Emergency Response Fund (CERF) to support immediate emission reductions and climate change adaptation (ICAP, 2023b).

The following figure describes the price development of the NZ ETS over time.

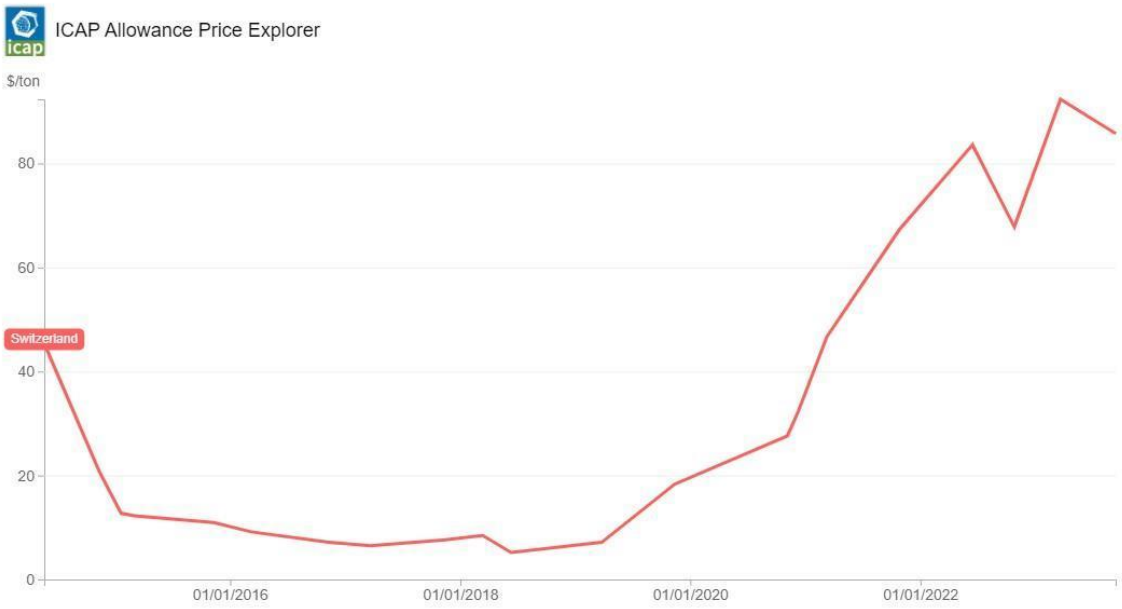

Figure 12: Price development of the NZ ETS over time

Source: ICAP (2023)

The NZ ETS registry

Section 10 of the Climate Change Response Act 2002 sets out the purpose of the NZ ETS registry. The main purpose is to ensure the accurate, transparent, and efficient accounting of the issue, holding, transfer, surrender, and cancellation of NZUs and approved overseas units and the conversion of NZUs in accordance with regulations to ensure the accurate, transparent, and efficient exchange of information between the NZ ETS registry, overseas registries, and international transaction bodies, and to facilitate the exchange of information.

Based on that, the Environmental Protection Authority of New Zealand established the New Zealand Emissions Trading Register (NZETR), which is New Zealand's national registry for emission units, and acts as a Registrar to manage the NZ ETS registry. The NZETR records various information such as ETS participants, ETS emissions returns, non-compliance, and ETS unit movement, including surrenders, allocations, and entitlements.

Market monitoring and oversight

Market monitoring and oversight of the NZ ETS is divided between different institutions. The Ministry for the Environment is responsible for establishing the regulatory framework of the NZ ETS, while the Environmental Protection Authority is the competent authority responsible for the NZ ETS Registry, as well as compliance. The Ministry of Primary Industries is responsible for the forestry sector.

Various participants participate in the NZ ETS in different ways: entities that are subject to reporting or surrendering obligations, as well as participants whose activities result in carbon removals and the creation of NZUs. Currently, as part of the market monitoring,

for companies that are compliance entities under the NZ ETS, the yearly reporting period ends on 31 December, while the reporting of annual emissions is due on 31 March of the following year, and surrendering of NZUs is to be done by 31 May of the following year.

As part of market oversight, where an entity under the NZ ETS fails to submit an emission report by the due date, it must pay a fine equal to the number of units involved, multiplied by the current unit price and a culpability factor. Where an entity fails to surrender the equivalent amount of NZUs, it must pay a cash penalty of three times the current market price for each NZU. Other enforcement includes fines for failing to collect emission data, failing to keep records, and providing incomplete or misleading information.

Unlike most other ETSs, the NZ ETS classifies the primary and secondary markets of the NZ ETS as allowances and not as a financial instrument. This was set out by the New Zealand government in its New Zealand Emissions Trading Scheme market governance paper.

Table 4: Classification of carbon allowances by countries

	NZ ETS	EU ETS	UK ETS	Australia ETS
Primary and secondary markets	Allowances	Financial instrument	Financial instrument	Financial instrument
Derivative market	Financial instrument	Financial instrument	Financial instrument	Financial instrument

Source: New Zealand Ministry for the Environment (2023)

As such, the New Zealand government has proposed to increase the regulatory oversight of the NZU market by making the NZU a financial product, for the purpose of the 'fair dealing' provisions under the Financial Markets Conduct Act.

Price management measures

The Climate Change (Auctions, Limits, and Price Controls for Units) Regulations 2020 version as of 01 November 2023 describes different price management measures for the NZ ETS (Climate Change (Auctions, Limits, and Price Controls for Units) Regulations 2020, 2021).

- *Prescribed minimum price*: NZUs cannot be sold at auction for a price below this minimum price. The prescribed minimum price changes every year according to the Climate Change Regulation;
- *CCR – Trigger price for sale of NZUs reserve amount*: The Climate Change Regulation also states a trigger price updated every year. If a trigger price is reached in the auction, a reserve amount of NZUs for each trigger price will be released for sale;
- *Confidential reserve price*: Another minimum price at the auction that is higher than the prescribed minimum price to avoid selling NZUs at auction for prices considerably lower than the values on secondary markets. The methodology for

calculating confidential reserve price is set and reviewed by the Minister of Climate Change and the price is calculated by the auction operator for each auction.

II.3.2.3. Institutional set-up

The institutional arrangements of the NZ ETS are defined in the Climate Change Response Act 2002 and related secondary legislation. The institutional arrangements of the NZ ETS involve different institutions responsible for specific aspects of the ETS, from regulatory development, administrative and compliance oversight, to other operational responsibilities. They changed over time and are reflected in the amendment of relevant legislation and regulations to improve the operation of the system and avoid overlap in functions and responsibilities related to the ETS.

The Ministry of Economic Development

In the initial design of the NZ ETS, the Ministry of Economic Development (now the Ministry for Business, Innovation and Employment) was responsible for the administration of the NZ ETS, including compliance and enforcement (New Zealand's Ministry for the Environment, 2008). It administered the NZETR. Other operational responsibilities for the NZ ETS in the 2008 design also involved the Ministry of Agriculture and Forestry (now the Ministry for Primary Industries) and the Ministry for the Environment.

Currently, the NZ ETS's main ministerial and operational responsibilities are delegated to the Ministry for the Environment, the Environmental Protection Authority, and the Ministry of Primary Industries (Leining, 2022).

The Ministry for the Environment

The Ministry for the Environment is responsible for advising the Government on environmental issues and thus also for climate change impacts and the Government's response to these (New Zealand's Ministry for the Environment, 2022). The Ministry for the Environment is responsible for coordinating climate change policy across the government, including the Climate Change Response Act 2002. The Ministry for the Environment leads the implementation and development of the NZ ETS and related regulations under the Climate Change Response Act. In addition, the Ministry for the Environment provides support to the Minister of Climate Change in setting emissions budgets and developing emission reduction plans. The Ministry for the Environment also collaborates with the Ministry for Primary Industries to advise on an agricultural emissions pricing mechanism.

The Minister of Climate Change

The Minister of Climate Change is responsible for the overall climate change policy direction, including setting and meeting emissions budgets, price control settings, and developing emissions reduction and adaptation plans. The Minister's roles and responsibilities in relation to the NZ ETS are outlined in the Climate Change Response Act 2002. The Minister was given additional power, functions, and responsibilities in the Zero

Carbon Amendment 2019 (Shaw, 2022). The Minister advises the Governor-General on allocation plans providing for pre-1990 forest land and fishing and oversees the allocation plans, as well as regulations related to the ETS. The Minister exercises powers over the management of the NZ ETS by directing the Chief Executive on matters related to the NZ ETS and managing the issuance, selling, and allocation of NZUs of the Government.

The Environmental Protection Authority

The Environmental Protection Authority is the supervisory authority of the NZ ETS and administers all non-forestry sectors in the NZ ETS since it was established in 2011 (Leining & Kerr, 2018; New Zealand's Environmental Protection Authority, n.d.-b). The Environmental Protection Authority is responsible for industrial allocations, emissions registry, monitoring and ensuring compliance with the ETS and publishing relevant reports, as well as other relevant administrative duties. It operates the NZETR, including managing the holding accounts and other aspects related to transactions in the ETS.

The Ministry for Primary Industry

The Ministry for Primary Industry oversees the forestry sector in the NZ ETS, including forestry-related implementation and administration activities (New Zealand's Environmental Protection Authority, n.d.-b; New Zealand's Ministry for the Environment, 2022). The Ministry for Primary Industry advices jointly with the Ministry for the Environment on an agricultural emissions pricing mechanism. In addition, the Ministry for Primary Industry plays a crucial role in shaping government policies for the forestry and agriculture sectors, including policies for the NZ ETS.

The New Zealand Customs Service and the New Zealand Transport Agency

The New Zealand Customs Service and the New Zealand Transport Agency oversee a portion of the synthetic GHG regulations outlined in the Climate Change Response Act (New Zealand's Environmental Protection Authority, n.d.-b). They are responsible for administering the Synthetic Greenhouse Gas Levy, which applies to the quantity of GHGs embedded in imported goods and vehicles.

The Climate Change Commission

The Climate Change Commission established in 2019, is an independent Crown advisor for the Government on climate change action (New Zealand's Ministry for the Environment, 2022). It provides advice on climate change mitigation and adaptation and tracks and evaluates the Government's progress related to emissions reduction targets and climate change adaptation plans.

NZX Managed Auction Service

NZX Managed Auction Service managed by NZX and EEX, does auctioning on behalf of the New Zealand Government (EEX, 2020). A joint bid by NZX and EEX was selected through a competitive tender to develop and operate the managed auction service for the NZ ETS. NZX hosts and handles the execution of the auctions, while EEX contributes the bidding infrastructure and expert support. The counterparty for the ETS auction is the Ministry

for the Environment (NZX Managed Auction Service, n.d.). Any organizations or individuals that want to participate in ETS Auctions must be registered on the NZETR and notify the NZETR. They can then register with the ETS Auctions.

Market Participants

Another important group of the NZ ETS market is the participants, including both mandatory entities and voluntary entities. As mentioned in the overview, the NZ ETS covers stationary energy, transport, industrial processes, waste, forestry, and agriculture sectors. Specifically, entities carrying out activities listed in Schedule 3 and Schedule 4 of the Climate Change Response Act 2002 are subject to be participants of the NZ ETS (Climate Change Response Act 2002, 2002). In addition, entities can also voluntarily participate in the NZ ETS if they conduct certain activities, such as post-1989 forestry activities.

In order to participate in the market, entities must register a holding account in the NZETR. An NZETR Account Holder may register on the ETS Auctions to participate in auctions. Regardless of the compliance status, participants have obligations under the NZ ETS, including registering, emissions reporting, and units surrendering or receiving, depending on the type of participants (New Zealand Emissions Trading Register, n.d.; New Zealand's Environmental Protection Authority, n.d.-a). Participants who emit GHG must surrender NZUs or other eligible emission units to the New Zealand Government. Participants, mainly forest owners or EITE facilities, who conduct GHG removal activities may receive NZUs from the New Zealand Government.

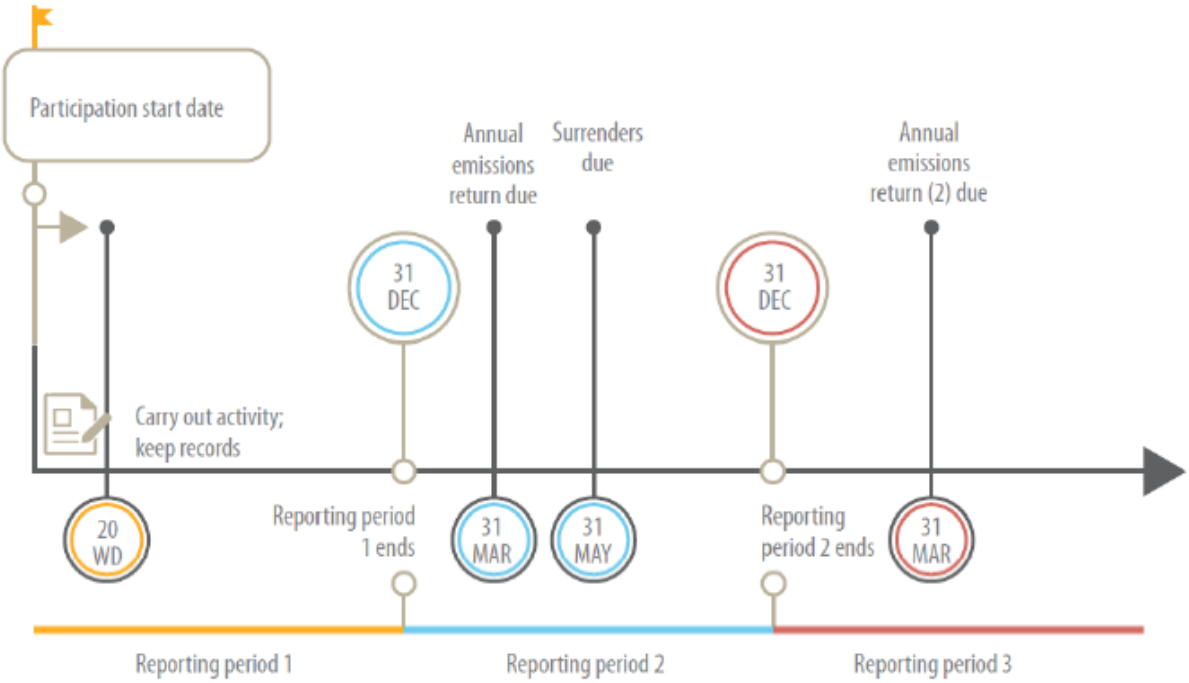

Figure 13: Participant obligations under NZ ETS

Source: New Zealand Emissions Trading Register (n.d.)

The figure below demonstrates the institutional arrangements of the NZ ETS.

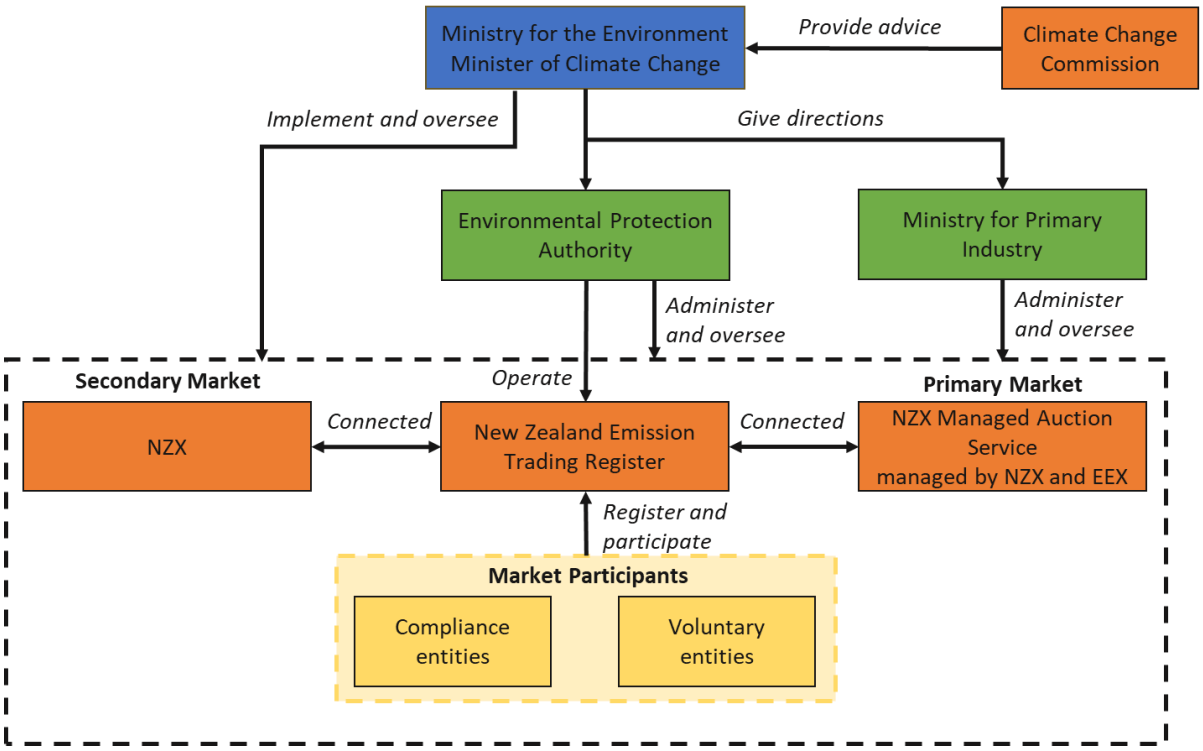

Figure 14: Institutional arrangements of the NZ ETS

Source: Compiled by the Consultant (2023)

II.3.2.4. Infrastructure

NZU transactions are facilitated in the NZETR, which is New Zealand's national registry for emission units.

Within the NZ ETS, there are currently no offsets available (ICAP, n.d.-b). Thus, the following section will focus on two critical elements: (i) Infrastructure required for NZU auction; and (ii) Infrastructure required for trading in the secondary market.

The infrastructure required for auctioning

The auctions in the NZ ETS occur four times annually through the NZ ETS Auctions platform (EEX, n.d.). Entities intending to participate must possess an account in NZETR. While a separate account in NZ ETS Auctions is necessary, it requires applicant details from their Register.

Upon successful registration with the NZETR, participants can register on the NZ ETS Auction platform using their NZETR account information. Before auctions, participants must provide collateral (either cash or a letter of credit) to NZX to ensure compliance. Subsequently, during the bidding window, participants place bids, which are reviewed by the auction operator for acceptance or rejection.

Bids are collected within the window and arranged from highest to lowest price. The clearing price is determined by the lowest bid that satisfies the entire auction volume. The auction proceeds if the clearing price meets or surpasses the confidential reserve

price. Bids at the clearing price might be partially filled to match the available auction volume.

After the auction, successful bidders receive an invoice via email, calculated by totaling successful bids at the clearing price. Settlement is acknowledged only upon complete payment of these invoices. Upon receipt and reconciliation of payments, participants receive email confirmation, and NZUs are transferred to the designated Registry account.

Overall, the infrastructure required for the NZU auction is demonstrated in the figure below.

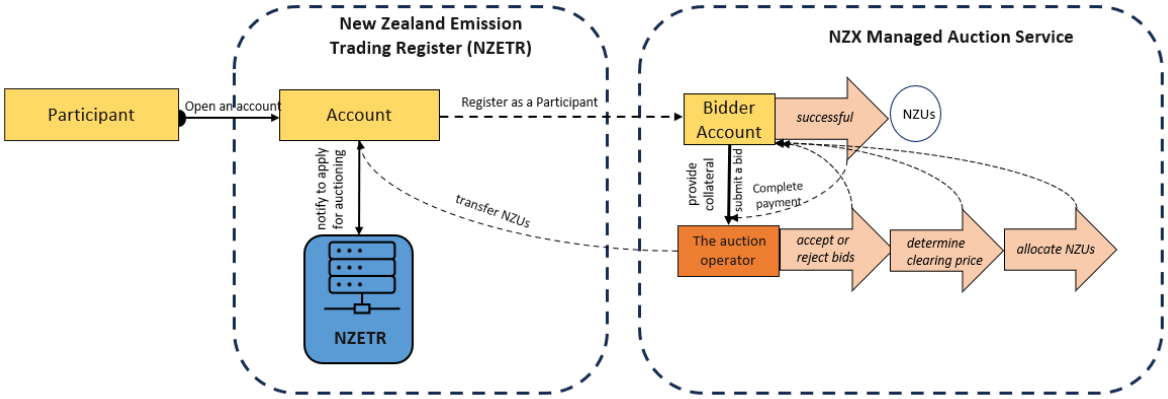

Figure 15: Infrastructure required for auctioning in the NZ ETS

Source: Compiled by the Consultant based on EEX (n.d.)

Infrastructure required for trading in the secondary market

Most NZUs are actively traded within the secondary market either through OTC transactions or via established trading platforms like the NZX. OTC transactions involve direct transfers of NZUs between sellers and buyers using their respective accounts on NZETR. The following figure presents an overview of the infrastructure pertinent to trading in the secondary market, specifically focusing on OTC trading.

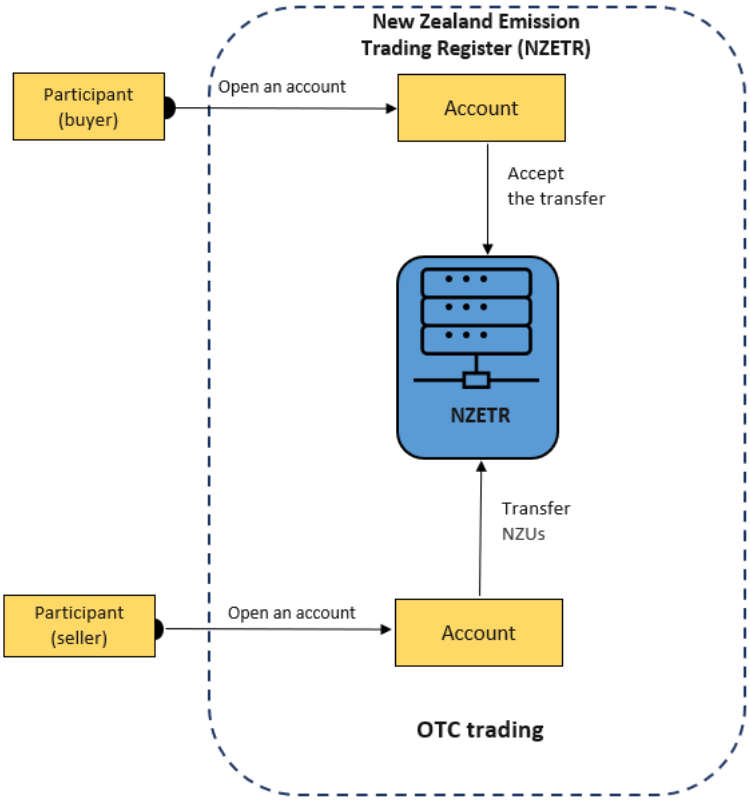

Figure 16: Infrastructure required for trading in the secondary market in the NZ ETS

Source: Compiled by the Consultant based on the Ministry for the Environment (n.d.)

Compliance entities also use their accounts in NZETR to surrender their obligations. Overall, the required infrastructure of the CTX's formulation in the NZ ETS is demonstrated in the figure below.

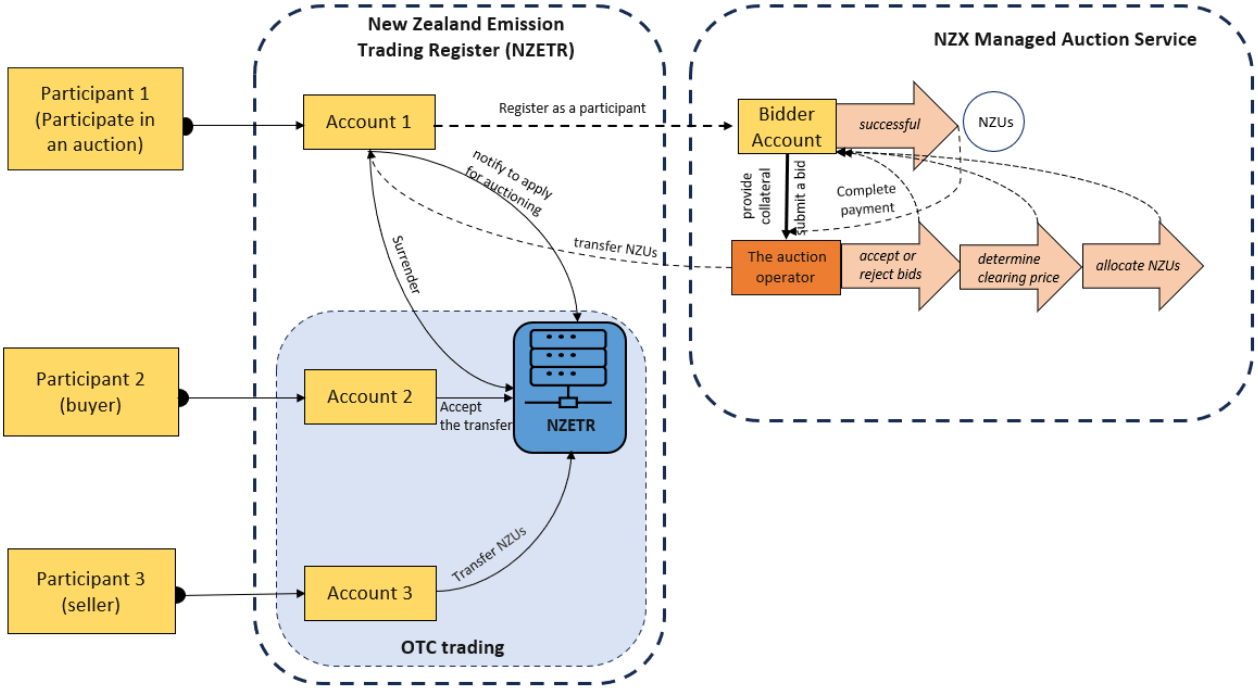

Figure 17: Overall CTX infrastructure in the NZ ETS

Source: Compiled by the Consultant (2023)

II.3.2.5. Implementation challenges and solutions

NZ ETS is the second-oldest program after the EU ETS. For over 13 years of operation, the program has revealed the following challenges and lessons learned (Benjamin Rontard & Humberto Reyes Hernandez, 2022):

- Use of international units: The NZ ETS was open to the international market and allowed international units from the Kyoto Protocol to trade on the domestic market. However, international units were sold at a low price because of excess supply, decreasing the internal rate;
- Cap setting: The NZ ETS did not enforce a limit of units generated each year. Therefore, there was no supply limit of allowances in the market from the government;
- Free allocation to emissions-intensive and trade-exposed industries (EITE): Highly emissions-intensive producers received 90% of an allocative baseline, and moderately emission-intensive producers received 60%.

The low price of units, the free allocation for EITEs, and the absence of a cap on allowances constrained incentives for small emissions investment.

To address the low price due to the oversupply of international units, the NZ ETS delinked the local market from international units in 2015. In 2019, the government introduced the Climate Change Response Amendment Bill to establish a supply limit of emissions (cap). A shift from fixed price purchasing to an auctioning system was proposed with a possible adoption of reserve auction price and cost containment reserve. A free allocation

system is phased down from 2021 to 2050 (Benjamin Rontard & Humberto Reyes Hernandez, 2022).

II.3.3. The California ETS

II.3.3.1. Overview of the California ETS

California implemented its ETS in 2013, which is considered a key element for the state to achieve the GHG emission reduction target of 15% below 1990 levels by 2020 (CARB, 2006). Under the recent Scoping Plans, California aims to reduce 40% below 1990 levels by 2030 and achieve carbon neutrality by 2045 (CARB, 2022).

Currently, there are approximately a total of 330 registered or opt-in entities, representing a total of 450 facilities participating in the California ETS and 85% of emissions from California (C2ES, n.d.). The California ETS covers transport, building, industry, and power sectors (ICAP, 2023d).

The first compliance period of the California ETS was from 2013-2014 with a cap of 162.8 $MtCO_2e$ and a reduction rate of about 2% annually. The second compliance period was from 2015-2017 with the expansion to fuel distribution and the cap declined at 3.1% per year on average from 394.5 $MtCO_2e$ in 2015. The third compliance started with a cap of 358.3 $MtCO_2e$ period and an annual average reduction rate of 3.3% over the 2018-2020 period. As part of the fourth compliance period from 2021 – 2030, there is a reduction in the cap for the California ETS by 13.4 $MtCO_2e$ each year, to reach 200.5 $MtCO_2e$ in 2030 (ICAP, 2023d).

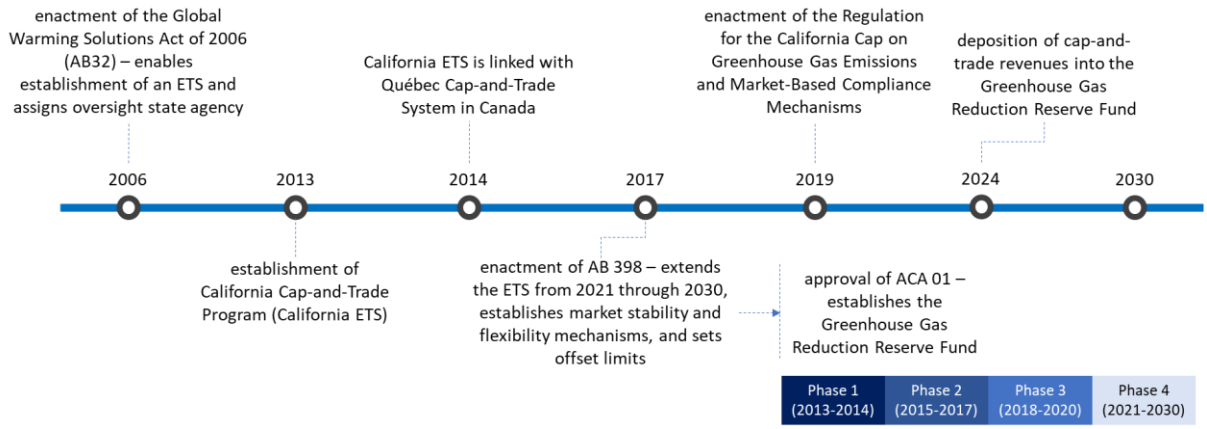

Figure 18: California ETS Implementation Progress

Source: Compiled by the Consultant (2023)

Allowances in the California ETS are distributed via free allocation, free allocation with consignment, and auction. Free allocation was set for 100% in the first compliance period and declined to 75% and 50% for facilities with medium leakage risk, and 50% and 30% for facilities with low leakage risk for the second and the third compliance period, respectively. The system intends to phase out 100% free allowances by 2030 (ICAP, 2023d).

For free allowance with consignment, electrical distribution utilities and natural gas suppliers receive free allowance on behalf of their ratepayers and a certain percentage must be consigned for sale at the state's regular quarterly auctions. The revenue from auctioning is required to be used for the benefit of the ratepayers and GHG emission reductions (ICAP, 2023d).

In 2022, about 65% of total allowances were put on auction, including about 38% owned by the California Air Resources Board (CARB) and 27% consigned by utilities. The cumulative revenue since the beginning of the program was USD 22.25 billion and the revenue excluding the one collected from auctioning of consigned allowances in 2022 was USD 4.03 billion. Most of the revenue goes to the Greenhouse Gas Reduction Fund, which is used to support disadvantaged and low-income communities and projects that deliver significant environmental, economic, and public health benefits (ICAP, 2023d).

Reporting is required for entities emitting from 10,000 tCO_2e per year while those emitting equal or above 25,000 tCO_2e per year are required to participate in the ETS. Facilities emitting below 25,000 tCO_2e can voluntarily participate in the ETS (opt-in covered entities). Annual verification is required to be performed by an independent third- party for all covered entities. Penalties shall be applied to the covered entities that fail to meet their surrender obligation or are committed to mis- or non-reporting of GHG emissions (ICAP, 2023d).

Banking is allowed, subject to a holding limit, while borrowing is not allowed.

Credits issued by CARB or by the authority of a linked cap-and-trade system can be used to offset up to 8% of the entities' emission obligations for 2013-2020 period, which will decrease to 4% for 2021-2025 period and then increase to 6% for 2026-2030 period. California ETS linked with Québec ETS in January 2014 and with Ontario ETS[8] in January 2018 (ICAP, 2023d).

II.3.3.2. Legal basis

The legal basis underpinning the California ETS is the Global Warming Solutions Act of 2006 (AB32), which called for California to reduce the state's GHG emissions. Under the Act, CARB is the state agency in charge of monitoring and regulating GHG emissions.

Legal Designation of the Emissions Exchange

According to the Final Regulation Order of the California Cap on Greenhouse Gas Emissions and Market Based Compliance Mechanisms Regulation (California ETS Regulation), under Article 95814(a)(1)(C), an emissions exchange is considered as Voluntarily Associated Entities as it provides clearing services for the purpose of clearing transactions between two entities registered under the California ETS. A qualified entity must be a derivatives clearing organization as defined in the Commodities Exchange Act that is registered with the U.S. Commodity Futures Trading Commission (CARB, 2019).

[8]Ontario ended its emission trading program on 05 February 2021 (https://www.ontario.ca/page/ontario-emissions-trading-code).

When the CARB approves a Voluntarily Associated Entity, an Exchange Clearing Holding Account is then created.

There are a number of Voluntarily Associated Entities such as ICE and CME Group that provide clearing services for California allowances, which provides for the delivery of applicable California carbon allowances with the Compliance Instrument Tracking System Service (CITSS).

Traded commodities in the California ETS

As said above, under the California ETS, allowances are distributed to the covered entities via free allocation, free allocation with consignment, and auction.

Industrial facilities are provided free allowances to minimize carbon leakage, and the amount is based on a product-specific benchmark, recent production volumes, cap adjustment factors, and an assistance factor based on an assessment of leakage risk.

CARB also facilitates a compliance offset program, enabling the issuance of carbon credits by CARB. These credits originate from projects carried out under the following accepted Compliance Offset Programs under the California ETS:

- California Action Reserve;
- Verified Carbon Standard by Verra;
- Climate Action Reserve.

In terms of accepted compliance offset protocols, CARB accepts projects carried out as one of six compliance offset protocols:

- US forest projects;
- Urban forest projects;
- Livestock projects (methane management);
- Ozone-depleting substances projects;
- Mine methane capture projects; and
- Rice cultivation projects.

From 2021 onwards, it is required that 50% of any compliance credits being surrendered shall provide direct environmental benefits to the state (ICAP, 2023d).

Direct environmental benefits to the state are defined under section 95989 of Assembly Bill 398 (AB 398; Chapter 135, Statutes of 2017) as projects that result in "the reduction or avoidance of emissions of any air pollutant in the state or the reduction or avoidance of any pollutant that could have an adverse impact on waters of the state." Based on the different compliance offset protocols, how direct environmental benefits to the state (DEBS) are determined would differ. Offset projects that fall within the state of California are automatically considered to provide DEBS. Where the offset project occurs out of state, it would be required to provide documentation to CARB to demonstrate how they also provide DEBS. Offset projects that meet the requirements as set out in section 95989 will receive a 'DEBS' flag within CITSS, which will also be reflected.

Operation of the Emissions Market

The California ETS is designed to make a significant contribution to achieve emission reductions compared to its BAU projections up to 2030. A cap trajectory has also been set through 2030 as provided in the figure below:

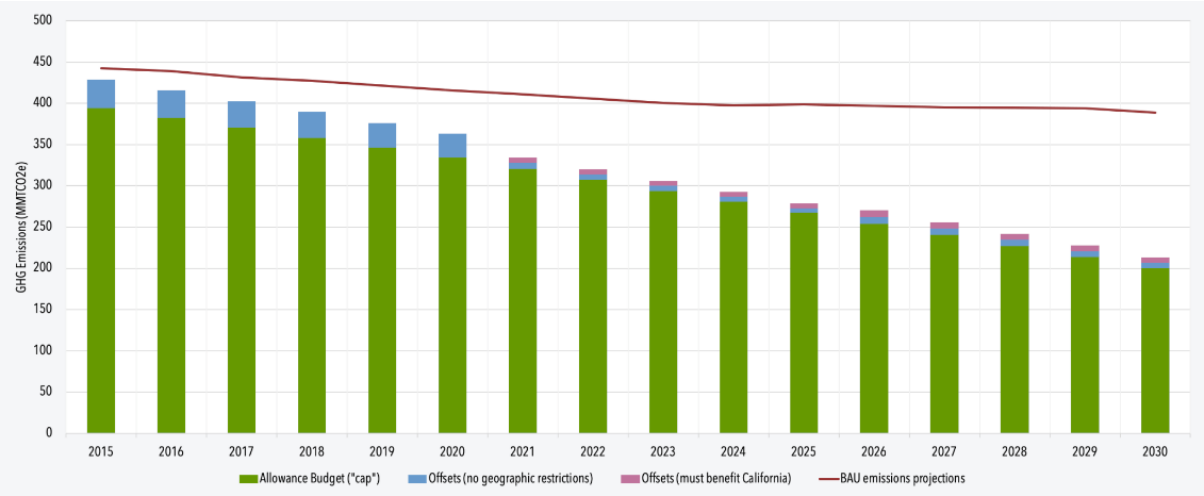

Figure 19: California's GHG emission cap and BAU projections

Source: California Cap and Trade (C2ES, n.d.)

The California ETS aims to create a powerful economic incentive for significant investment in cleaner, more efficient technologies. With the declining limit of the cap and well-functioning markets overseen by CARB, carbon prices on both the primary market and the secondary market stayed stable over a long period and have been on the increase in recent years to reflect the state's ambition targets. The following figure describes the price development of the California ETS over the 2014-2023 period.

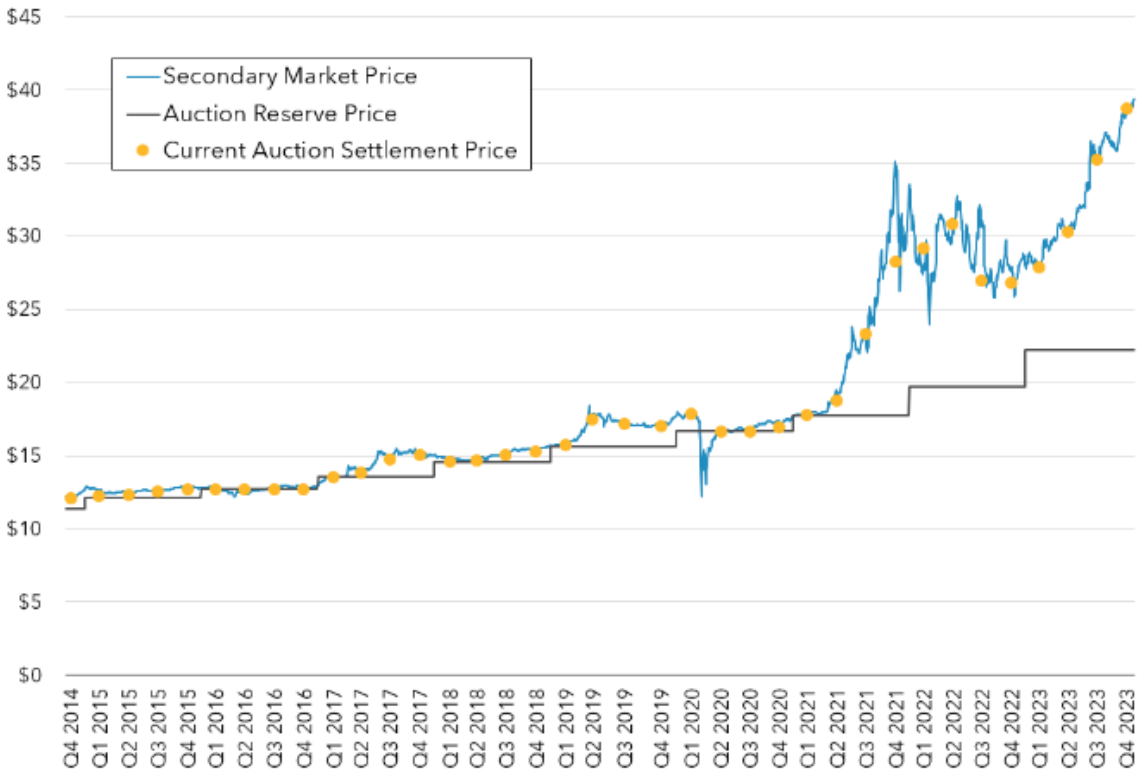

Figure 20: Price development of the California ETS over time

Source: ICAP (2023)

Under AB32, CARB is required to develop a Scoping Plan that describes the approach taken by California to achieve its GHG emission reduction targets. The first Scoping Plan was approved by the Board in 2008 and must be updated at least every five years. Since 2008, there have been three updates in 2013, 2017 and 2022.

The latest Scoping Plan (2022 Scoping Plan) projected a 48% reduction of emissions below 1990 levels in 2030, which exceeds the statutory 40% reduction target, and identified a technologically feasible and cost-effective pathway for California to achieve carbon neutrality by 2045.

California ETS registry

The ETS regulation has sub-article 5 that provides detailed requirements on registration and accounts. Accordingly, eligible entities for registration in the tracking system are covered entities, opt-in covered entities, and voluntarily associated entities. The Executive Officer of CARB will serve as the account administrator or may contract with an entity to serve as the account administrator. There are 4 types of accounts: Holding Accounts, Limited Use Holding Accounts, Compliance Accounts, and Exchange Clearing Holding Accounts. One entity cannot register for more than one account of each type (CARB, 2019).

The CITSS can be considered a sort of registry in the California ETS. It is a market tracking system that supports the implementation of the ETS. Managed by the Western Climate

Initiative, Inc. (WCI), this is a web-based system that tracks the compliance instruments from the point of issuance by the CARB, to ownership, transfer, and final retirement for compliance purposes.

Market monitoring and oversight

Under the Global Warming Solutions Act of 2006, CARB is responsible for the design and implementation of the California ETS, including the consultation processes in determining the GHG levels.

As part of the market oversight role, CARB also monitors the compliance and enforcement of any rules against the entities that are covered by the California ETS. Under the CARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions, industrial sources, fuel suppliers and electricity importers must report their annual GHG emissions to CARB, with the submitted data being required to be verified by a CARB-accredited independent third-party verifier.

Additionally, WCI provides administrative and technical solutions for supporting the coordinated development and implementation of the California and Quebec ETS, such as administering auctions and maintaining the system registry.

Recently, California introduced new regulations to regulate the voluntary carbon market and climate-related claims. Assembly Bill 1305 and the Voluntary Carbon Market Disclosure Business Regulation Act cover disclosures made by businesses making emissions-related claims associated with the use of carbon offsets, offset marketers, and sellers.

Cost Containment and Market Flexibility Mechanisms

Cost Containment design for the Cap-and-Trade Program includes several measures to ensure successful implementation (AB 398, 2017a). These measures are:

- Multi-year compliance periods to even out annual emissions fluctuations;
- Banking of allowance with strict holding limits, which enables participants to store allowances for future compliance;
- Limited use of offsets, which provides low-cost emissions reduction opportunities. The offset limits are 4% for 2021 emissions, and increasing to 6 percent starting with 2026 emissions;
- The establishment of an Allowance Price Containment Reserve (Reserve), which grants covered entities access to allowances at set prices to mitigate against high costs. 4% of allowances are held in the Reserve;
- The creation of a price ceiling to guarantee effective cost containment while achieving the required GHG emission reductions.

When a quarterly auction results in a settlement price that is greater than or equal to 60% of the lowest Reserve tier price, the CARB will offer allowances through a Reserve sale. CARB will also offer a Reserve sale every year immediately preceding the compliance deadline.

During the compliance period of 2021-2030, allowances in the Reserve will be offered in two tiers. Pursuant to section 95913(h)(5) of the California ETS Regulation, the two-tier prices are set at USD 41.40 and USD 53.20 in 2021, with a 5% increase plus inflation each year.

Additionally, section 95913(f)(1)(A) of the California ETS Regulation also imposes a price ceiling of USD 65 per allowance or price ceiling unit, which increases by 5% plus inflation each year. The price ceiling sale occurs where a compliance entity does not have sufficient eligible compliance units in their holding and compliance accounts, and no allowances remain in the Reserve, CARB may offer an annual price ceiling sale to cover the opt-in covered entities to purchase what they need to meet their compliance obligation due that year.

Inter-linkages with other ETS

The California ETS Regulation provides general requirements and procedures for the approval of external GHG ETS and the interchange of units with linked external ETSs.

In 2014, the California ETS was linked to the Quebec ETS. Both states signed the Agreement on the Harmonization and Integration of Cap-and-Trade Programs for Reducing Greenhouse Gas Emissions (the Harmonization Agreement). As part of this linkage, Article 6 of the Harmonization Agreement states that "there is a mutual recognition of the compliance instruments issued by both jurisdictions, along with trading, joint auctioning, and offset protocols". Similarly, as part of the Harmonization Agreement, Article 10 requires both the California ETS and Quebec ETS also utilize a common program registry and the same as the registry administrator for the ETS.

The two linked with Ontario ETS in January 2018, which was then removed from the linked carbon market as the Ontario government stopped the operation of their ETS in July 2018.

More recently, the Washington ETS has signaled an intent to pursue linking the Washington ETS with the California and Quebec ETS.

II.3.3.3. Institutional set-up

California has established a supportive institutional structure to implement AB32 and its integral Cap-and-Trade Program.

California Air Resources Board

CARB is the state agency in charge of monitoring and regulating sources of GHG emissions in order to reduce GHG emissions (California Global Warming Solutions Act of 2006, 2006). It holds the main responsibility for the development and implementation of the state's overall climate change program (Shen et al., 2014). Thus, the design and implementation of the California ETS Program is under CARB's responsibility (ICAP, 2023a). CARB and the Québec Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs (MELCCFP) are charged with holding joint GHG allowance auctions. In addition, CARB also organizes sales of allowances from the Allowance Price Containment Reserve. According to Assembly Bill (AB) 398, CARB is

required to report on progress toward meeting emissions reduction targets and leakage risks and updates to and implementation of the scoping plan (AB 398, 2017b).

Western Climate Initiative, Inc.

WCI administers an Auction Platform and a Program registry – the CITSS. It also provides administrative support, financial administrative services of auctions and reserve sales, as well as market monitoring analyses through a third-party contractor.

The Compliance Instrument Tracking System Service

CITSS is a market management and tracking system for accounts and compliance instruments, which facilitates the implementation of the California ETS (CARB, n.d.). CITSS functions include:

- Registration for entities and organizations participating in the California Cap-and-Trade Program;
- Tracking and record of compliance instruments (emissions allowances and offsets), including ownership, transfer, and compliance retirements;
- Facilitating emissions compliance;
- Market monitoring support.

CITSS accounts are mandatory for participants in the California ETS to conduct activities related to compliance instruments (California Air Resources Board, 2012).

WCI, Inc. Auction Platform

WCI, Inc. Auction Platform is an electronic platform where auctions and reserve sales of GHG allowances are conducted (WCI, Inc. et al., 2022; WCI, Inc. & CARB, 2023). To participate in an auction or a Reserve sale, an entity must have an approved CITSS account and complete an auction or Reserve sale application on CITSS. After that, the entity may access the Auction Platform to bid in an auction/ Reserve sale and retrieve the auction/ Reserve sale results.

The ICE, CME Group, and Nodal Exchange platforms

The ICE, CME Group, and Nodal Exchange platforms are trading platforms for allowances, offsets, and financial derivatives in the secondary market (ICAP, 2023a).

Independent Emissions Market Advisory Committee

Independent Emissions Market Advisory Committee established in compliance with AB 398, is responsible for reporting to both the state board and the Joint Legislative Committee on Climate Change Policies on the environmental and economic performance of the Cap-and-Trade Program and other relevant climate (AB 398, 2017b). The Independent Market Advisory Committee is also responsible for monitoring and evaluating activities related to compliance instruments, such as auction, holding, and transfer of allowances (Shen et al., 2014). This is to prevent market manipulation and promote a level playing field for all participants in the California ETS. In addition, the

Committee's functions aim to ensure the seamless operation of the market in terms of governance, processes, practices, and system structure.

Market Surveillance Committee

The Market Surveillance Committee is an independent market oversight organization assembled by experts in economics, trading, and commodity markets to assist in market monitoring and surveillance activities (Shen et al., 2014).

Compliance Offsets Protocol Task Force

Compliance Offsets Protocol Task Force established by AB 398, is responsible for providing guidance in approving new offset protocols that increase direct environmental benefits in the state while prioritizing disadvantaged communities, Native American or tribal lands, and rural and agricultural regions (AB 398, 2017b).

The Legislative Analyst's Office

The Legislative Analyst's Office is responsible for reporting on the economic impacts and benefits of the GHG emissions targets (AB 398, 2017b). Although the Legislative Analyst's Office does not have a specific role in the Cap-and-Trade Program, its recommendations are highly valued due to its long-standing involvement in California policymaking, its deep expertise, and its close ties to the legislature (Wang et al., 2022). The Legislative Analyst's Office has published several influential reports on the Cap-and-Trade Program, which have helped to shape the program's development and implementation. For example, the Office's analysis related to an oversupply of allowances in the state's ETS includes: an estimation of the range of the cumulative allowance oversupply; an assessment of the impacts of allowing the oversupply to carry over into a post-2020 program; and an assessment of the impact of alternative approaches in addressing the oversupply of allowances[9].

Greenhouse Gas Reduction Fund

All revenues from the auction or sale of allowances will be deposited into the Greenhouse Gas Reduction Fund (AB 398, 2017b).

Market Participants

Participants of the market include covered entities, opt-in covered entities, and Voluntarily Associated Entities (ICAP, 2023a). Facilities that emit more than 25,000 tCO_2e per year are included under the California ETS, along with all electricity imported from specified sources connected to a specific generator with emissions of over 25,000 tCO_2e per year (California Environmental Protection Agency, 2015). Facilities that emit less than 25,000 $MtCO_2e$ annually can choose to voluntarily participate in the program.

[9] See CARB, Initial Statement of Reasons: Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation Appx. D 10 (2018), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2018/capandtrade18/ct18398.pdf?_ga=2.55603309.73140785.1642018425-1158618940.1627694642 (citing letter from LAO to AM Cristina Garcia (June 26, 2017), available at https://lao.ca.gov/letters/2017/Garcia-cap-and-trade-062617.pdf).

As mentioned above, registration with CARB through CITSS is mandatory for all entities participating in the California ETS. The compliance requirements for covered entities are detailed in the California ETS regulation and include the following main requirements (Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms, 2019):

- GHG emissions reporting and verification in accordance with the CARB Regulation for the Mandatory Reporting of Greenhouse Gas Emissions;
- Surrendering valid compliance instruments to fulfill a cover entity's compliance obligation;
- Recording all data and documents for the compliance requirements, such as data for calculations of compliance obligations, emissions data and product data verification statements, and detailed verification reports.

Key dates for compliance obligation are presented in the following figure.

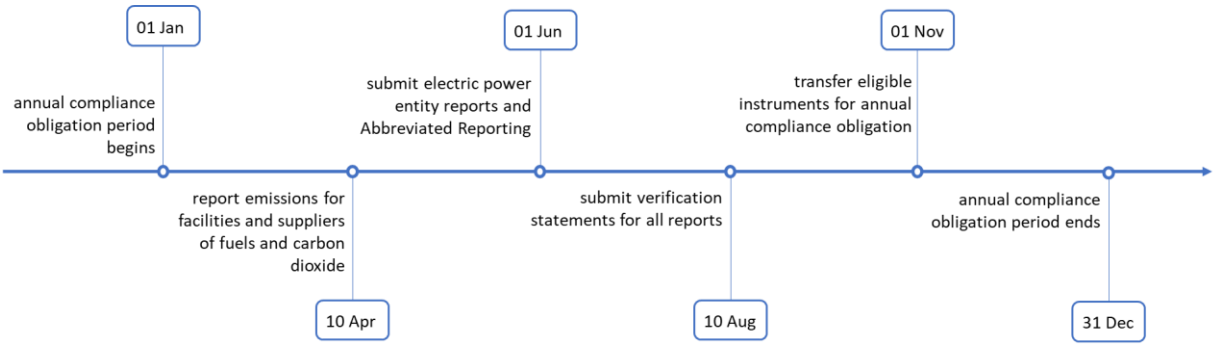

Figure 21: Compliance obligation deadlines for California ETS participants

Source: Compiled by the Consultant based on California Air Resources Board (2023a, 2023c)

The institutional arrangements for the California ETS are summarized in the figure below.

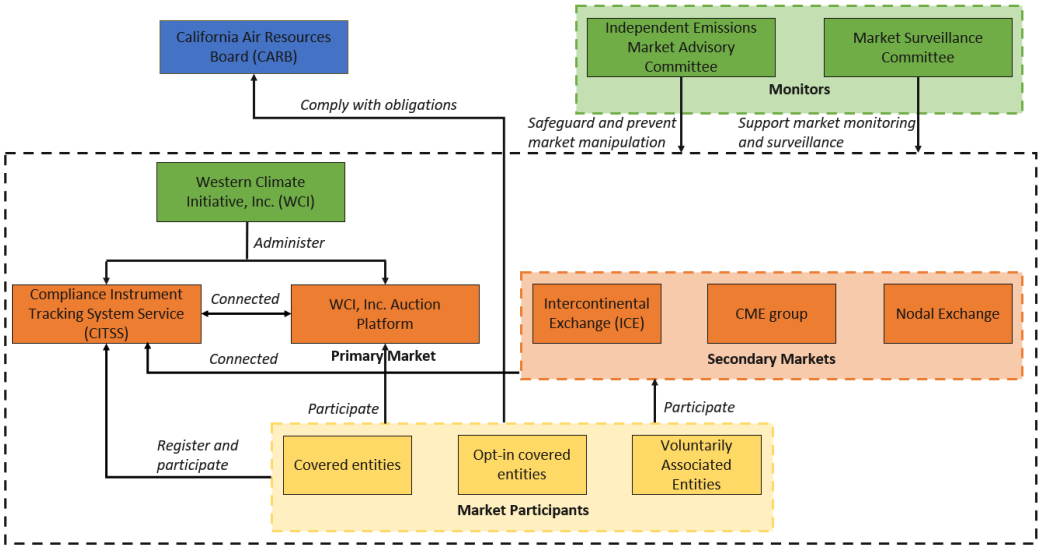

Figure 22: Institutional arrangements for the California ETS

Source: Compiled by the Consultant (2023)

II.3.3.4. Infrastructure

California's carbon credit transactions are facilitated through CITSS. This system acts as a comprehensive management and tracking platform for accounts and compliance instruments issued within participating WCI Cap-and-Trade Programs. CITSS meticulously monitors compliance instruments – such as emissions allowances and offsets – from their issuance by jurisdictional governments to their ownership, transfer among regulated GHG emitters, voluntary participants, and general market players, all the way to their final compliance retirement. The primary objective of CITSS is to streamline participation in the Cap-and-Trade Program for all stakeholders involved, including program participants, jurisdictional staff, and any contractors engaged in implementing Cap-and-Trade Program within the participating jurisdictions.

CITSS serves the crucial function of tracking compliance instrument transactions within and between entities' accounts. To facilitate this, each entity in CITSS is designated specific accounts based on its type or organization. Four account types exist within CITSS: General Account (referred to as Holding Account in the Regulation), Limited Use Holding Account, Compliance Account, and Exchange Clearing Holding Account. The details of each account type are outlined in the table below.

Table 5: Type of entity accounts in CITSS

No.	Account Type	Description
1	General Account (Holding Account)	Assigned to all entities (except Exchange Clearing Service Providers), facilitating routine transactions of compliance instruments between entities. Allocations of free allowances to industrial entities typically are placed in this account type.
2	Compliance Account	Exclusive to Covered Entities and Opt-In Entities, used solely to surrender compliance instruments to the State of California to meet Cap-and-Trade Program obligations.
3	Limited Use Holding Account	Granted to Electrical Distribution Utilities (EDUs) as per the Regulation. Allocations of free allowances are placed here and consigned to the California Auction Account under specific outlined conditions.
4	Exchange Clearing Holding Account	Provided to entities offering exchange clearing services in the Cap-and-Trade Program. These organizations temporarily hold compliance instruments to facilitate transactions between two registered entities. Must be a registered derivatives clearing organization.

Source: Compiled by the Consultant based on CARB (2017)

The critical components of the CTX infrastructure for the California ETS include: (i) Infrastructure required for offset projects; (ii) Infrastructure required for auctions; and (iii) Infrastructure required for trading in the secondary market.

The infrastructure required for offset projects

In adherence to the offset program framework, an offset project operator (OPO) is mandated to establish an account within a CARB-approved offset project registry (OPR). Within this framework, the OPO submits listing information for a compliance offset project to the OPR. Upon submission, the OPR reviews the project details and determines the issuance of registry offset credits (ROCs). Upon ROC issuance notification, the OPO proceeds reporting and verification documentation to the CARB via CITSS. Then, CARB undertakes a review and notifies the OPR to cancel the specific ROCs designated for issuance as ARB offset credits. Subsequently, the OPR promptly cancels the ROCs and communicates the cancellation to CARB immediately. Once CARB receives confirmation from the OPR regarding the cancellation of credits, it initiates the issuance of ARB offset credits within CITSS. These credits are then transferred into the respective participant's holding account to complete the process (Climate Action Reserve, n.d.). The infrastructure required for offset projects is demonstrated in the figure below.

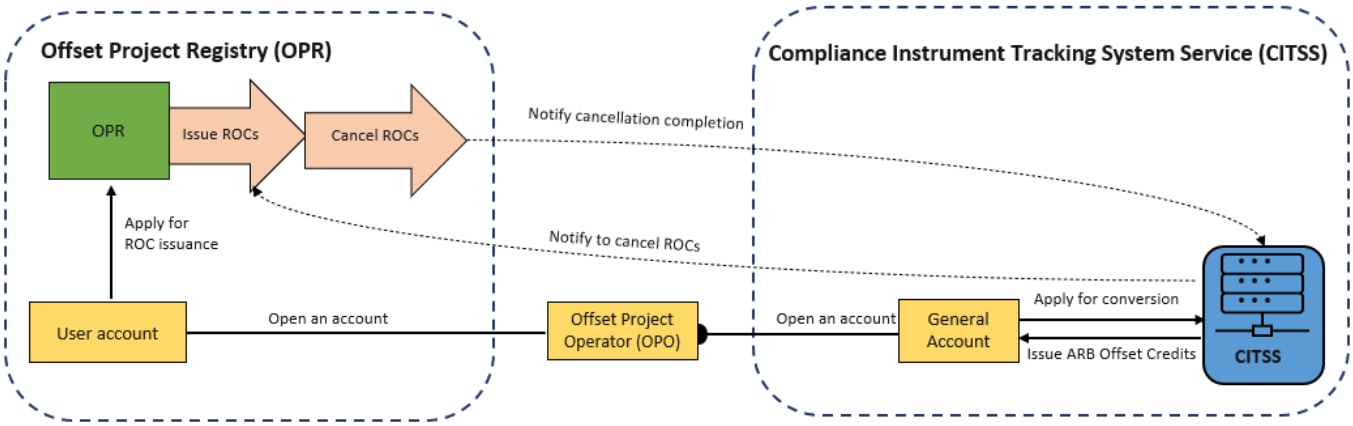

Figure 23: Infrastructure required for offset projects in the California ETS

Source: Compiled by the Consultant based on Climate Action Reserve (n.d.)

The infrastructure required for auctioning

Auctions are facilitated through the WCI, Inc. platform. To participate in an auction, a participant must hold an active CITSS General Holding Account without any suspensions or revocations (Emily Wimberger, 2019). Furthermore, an entity's account representative within CITSS must possess an active Auction Platform account before engaging in any auction activities. The entity's appointed representative is responsible for completing and submitting the entity's auction application within CITSS.

Once an auction application is submitted, applicants are required to provide a bid guarantee directly to the Financial Services Administrator (FSA) by the specified deadline. Subsequently, the FSA reviews and assesses these applications, either approving or

rejecting them for auction participation. Approved applicants meeting the qualifications gain access to conduct auctions through the WCI platform.

Representatives of qualified bidding entities submit their bids within the Auction Platform. The process of determining the settlement price is managed by the Auction Administrator, who ranks qualified bids from the highest to the lowest. Allowances are granted to participants starting from the highest qualified bid price and progressively moving to lower qualified bid prices until either all available allowances are allocated, or all qualified bids are fulfilled. Following the certification of the event, qualified bidders conclude the financial settlement process with the FSA for all awarded allowances (WCI, Inc., n.d.).

Upon completion of the financial settlement and distribution of auction proceeds, allowances from the auction platform account are transferred to the successful bidders' accounts. These allowances are then moved from the auction platform account to the participant's holding account within CITSS (CARB, 2023). Overall, the infrastructure required for the allowances auction is demonstrated in the figure below.

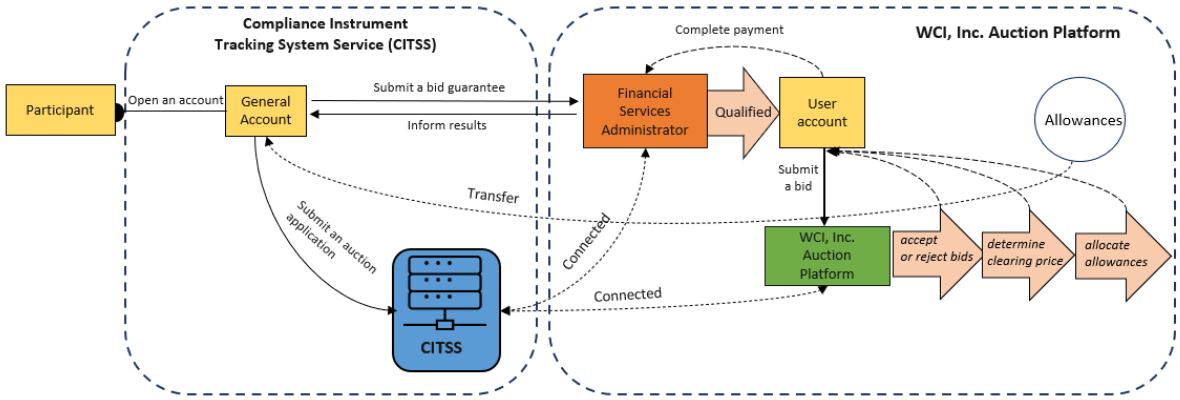

Figure 24: Infrastructure required for the allowances auction in the California ETS

Source: Compiled by the Consultant based on WCI, Inc. (n.d.)

Infrastructure required for trading in the secondary market

Participants also can buy or sell compliance instruments from each other via the secondary market. All secondary market transactions are registered with CITSS. Trading on the secondary market can either be exchange-based including the ICE, CME Group, and Nodal Exchange platforms, or OTC (ICAP, n.d.-d).

For OTC trading, sellers are required to access their Holding Account within CITSS and submit a transfer request for compliance instruments. Buyers then need to accept this transfer from the seller to conclude the transaction.

Regarding exchange-based trading, sellers initiate the process by transferring compliance instruments to their chosen Clearing Holding Account. Then, the Clearing Holding Account will transfer the compliance instruments to the Exchange's Clearing House. Concurrently, buyers deposit or transfer the full payment equivalent to the product's value into their selected Clearing Holding Account. Following this, the buyer’s clearing

Account must transfer the payment to the designated Clearing House bank account. Subsequently, the Exchange's Clearing House facilitates the clearing and settlement process. It initiates the transfer of allowances to the buyer's Clearing Holding Account and disburses payment to the seller's Clearing Holding Account. Eventually, allowances and payments are transferred to the respective accounts of buyers and sellers (CME Group, n.d.).

Overall, the infrastructure required for trading in the secondary market is illustrated in the figure below.

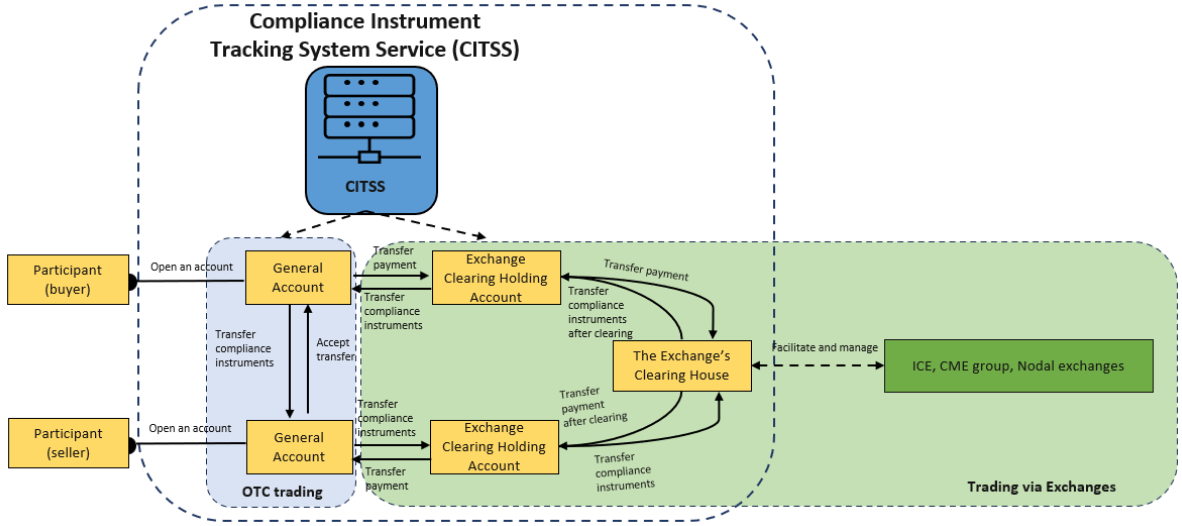

Figure 25: Infrastructure required for trading in the secondary market in the California ETS

Source: Compiled by the Consultant based on CME Group (n.d.)

In addition to the three mentioned components, Covered Entities and Opt-In Entities surrender compliance instruments via their Compliance Accounts to fulfill Cap-and-Trade Program obligations.

The figure below shows a refined summary of the necessary infrastructure for the CTX within the California ETS.

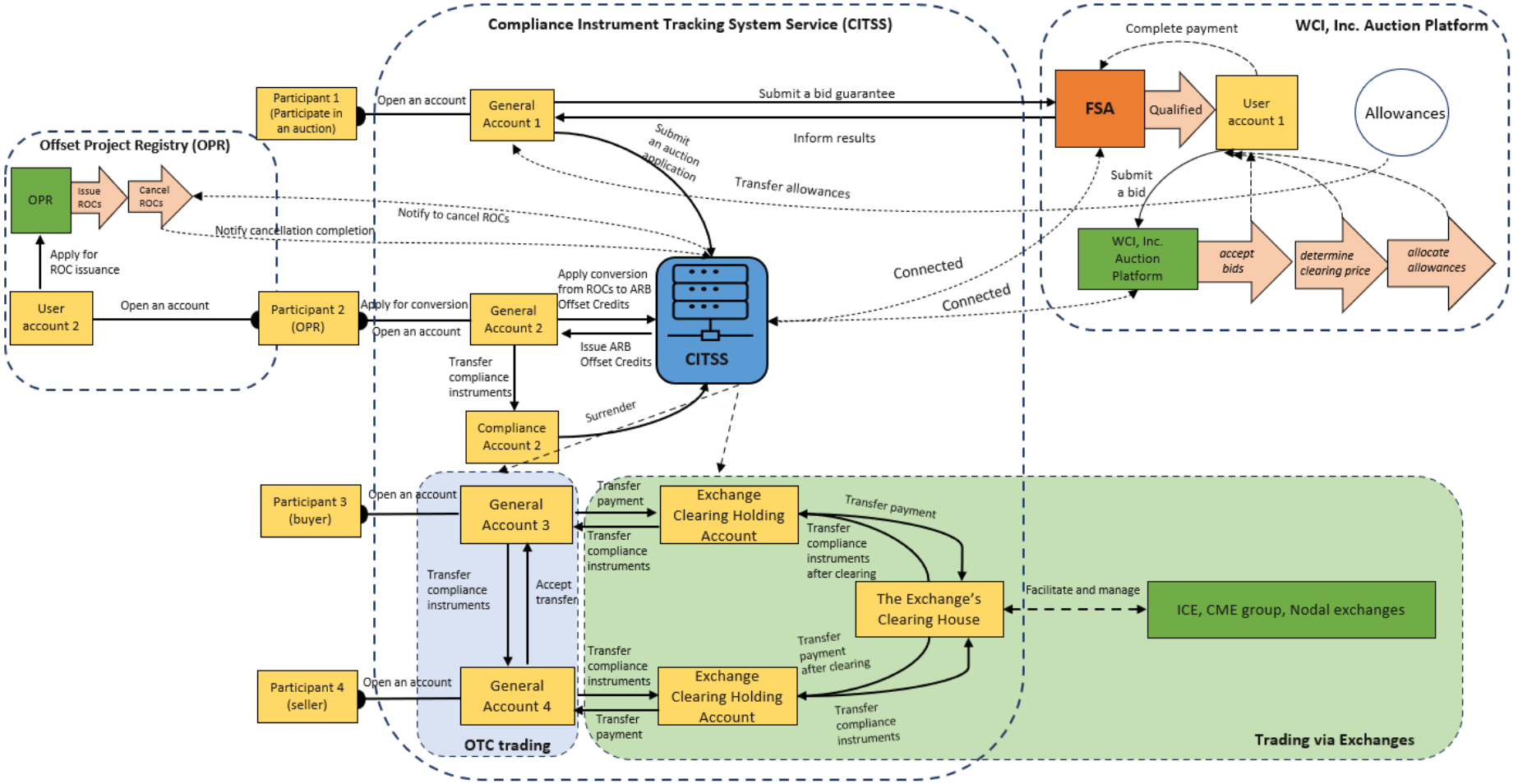

Figure 26: Overall CTX infrastructure in the California ETS

Source: Compiled by the Consultant (2023)

II.3.3.5. Implementation challenges and solutions

While the ETS is a key component for California to achieve its GHG emission goals, it is considered not stringent enough to drive additional emission reductions for the state to meet its 2030 GHG emission reduction goal, due to the following challenges:

- Over-banking: covered entities and outside investors accumulated a significant number of unused allowances to use in future years. Accordingly, they are likely to have more than enough banked allowances to comply with the program requirements even as they continue to emit at levels exceeding the cap (LAO, 2023);
- Environmental integrity of offsets: Offsets are the cheapest way to meet required reductions under an ETS. To meet the GHG reduction requirements, many of the largest emitters just bought credits and the majority of the offset credits (76%) were outside California (CEJA, 2017);
- Use of revenue from auction: In 2017, the California Chamber of Commerce and other entities challenged the lawfulness of the CARB's auction sale of allowances. They also argued the state's improper use of auction funds to support programs that lacked connection to GHG emissions by covered entities (Jonesday, 2017).

To address these challenges, CARB considers adjusting the cap downward to put the state on track to meet its 2045 GHG goal. There is also a limit for using offsets to 4% of compliance obligations from the 2021-2025 period and it is required that half of eligible offsets for the program be from projects that provide direct environmental benefits in California. The state legislation establishes the Greenhouse Gas Reduction Fund (GGRF) to ensure revenues from auction sales to be spent in relation to California communities most vulnerable to environmental harm (LAO, 2023) (CCCI, 2022).

II.3.4. The Korea ETS

II.3.4.1. Overview of the Korea ETS

South Korea introduced the Korea Emissions Trading System (K-ETS) in 2015 as part of its efforts to reduce GHG emissions and achieve its climate change goals. The Korean Government chose to implement an ETS as it is a market-based mechanism and is more advantageous to the economy because it allows the market to determine the carbon price, allocate resources efficiently, and mitigate the early impacts of carbon pricing on businesses and consumers.

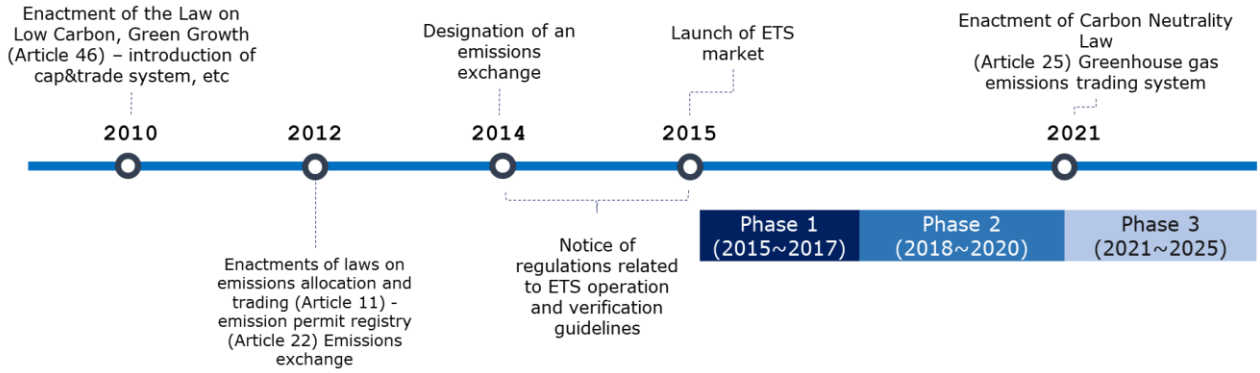

Figure 27: K-ETS Implementation Progress

Source: Korea Exchange (2021)

After the Kyoto Protocol came into effect in February 2005, the nation introduced the cap-and-trade system through the Framework Act on Green Growth (Green Growth Act) enacted in January 2010. In 2012, the Act on Allocation and Trading of Greenhouse Gas Emission Permits, also known as the Emissions Trading Act, and its enforcement ordinance were enacted.

From 2012, all facilities that are emitting more than 15,000 tCO_2e (50,000 tCO_2e for companies) are required to submit annual emissions statements to their respective ministries to keep track of their emissions. These emissions statements are recorded under the national GHG inventory system.

The government then designated the Korea Exchange as the emissions trading exchange, and regulations related to emissions trading such as market operation regulations were announced in the same year.

The emissions trading market was launched through the Korea Exchange in January 2015, marking the start of the first phase of the ETS. The first phase ran from 2015 to 2017, and the second phase operated from 2018 to 2020. The third phase, covering the years 2021 to 2025, is currently in progress.

During the 3rd phase, the existing “Framework Act on Green Growth” was abolished, and the “Framework Act on Carbon Neutrality and Green Growth (Framework Act on Carbon Neutrality)” was newly enacted to respond to the climate crisis.

II.3.4.2. Legal basis

The government, through the Framework Act on Low Carbon Green Growth, established three registry systems to support the implementation of K-ETS: the National Greenhouse Gas Management System (NGMS), the Emissions Rights Registry System (ETRS), and the Offset Registry System (ORS).

Under the law, the Ministry of Environment is mandated to establish and operate a National Greenhouse Gas Management System to develop, analyze, verify, prepare, and manage various information and statistics related to GHGs. As such, the Greenhouse Gas Inventory and Research Center (GIR) was established within the Ministry of Environment (Article 36 (1) of the Framework Act on Carbon Neutrality and Green Growth for Coping with Climate Crisis) to allocate emissions permits and track compliance.

Legal Designation of the Emissions Exchange

Article 34 (1-2) of the Enforcement Decree of the Emissions Trading Act enacted in May 2012 directed the Minister of Environment to establish an emission permit exchange in consultation with the heads of relevant central administrative agencies or designate an emission permit exchange after receiving an application from an institution. Necessary procedures for the designation or establishment of an emission permit exchange, supervision, and brokering transactions are prescribed by Presidential Decree (Article 22 (4) of the Emissions Trading Act).

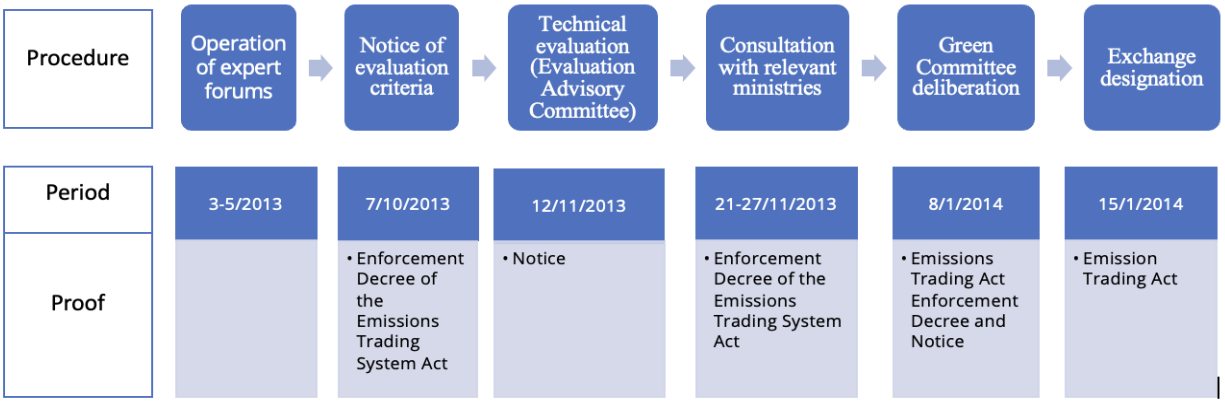

Figure 28: Emissions Exchange Designation Progress in the K-ETS

Source: Korea Ministry of Environment (2014)

The designation process for the Korean carbon trade exchange from 2013 to 2014 was comprehensive and transparent, ensuring that the most qualified exchange was selected.

The designation process began with a series of expert forums in March-May 2013. These forums were held to gather input from private experts and stakeholders in related fields. In July-August 2013, the government consulted with relevant ministries on the designation process and evaluation standards. In September 2013, the government announced the evaluation standards for the designation process.

An institution is eligible to apply if it has experience operating a clearing and settlement system for more than one year and has secured a certain level of professional manpower for related work. The evaluation procedure includes: (i) Receiving the application; (ii) Establishing an Evaluation Advisory Committee and evaluating the application documents; (iii) Consulting with relevant ministries (preparing 'Exchange Designation Review Report (draft)'); (iv) Green Growth Committee deliberate; (v) Noticing the final designation.

Two institutions, the Korea Exchange (KRX) and the Korea Power Exchange, applied. In November 2013, the government established an Evaluation Advisory Committee to conduct a technical evaluation of the two applicants. The Evaluation Advisory Committee was composed of 11 experts, including senior officials from government agencies and experts recommended by ministries.

In November-December 2013, the government prepared a draft exchange designation review in consultation with relevant ministries. In January 2014, the Green Growth Committee deliberated on the draft and finalized the designation. The KRX was designated as the Korean carbon trade exchange on 15 January 2014.

Table 6: Emissions exchange evaluation criteria and points distribution

Evaluation Criteria		Points
Total		**100**
A. Transaction stability	1. Subtotal	**50**
	2. System construction and operation	15
	3. Stable transaction operation	15
	4. Possibility of investigation into acts that disrupt market order	10
	5. Rational organization and operation and accumulation of similar experiences	10
B. Market activation	Subtotal	**20**
	1. Ease of transaction participation and level of customer service	15
	2. Possibility of linking with the international carbon market	5
C. Minimize market activation costs	Fixed, floating and operating cost levels	**20**
D. Policy implementation ability	Understanding and implementation ability of related policies	**10**

Source: Korea Ministry of Environment (2014)

Traded commodities in the K-ETS

Emitters can obtain emission permits through a variety of means, including purchasing them on the market, receiving them for free from the government, or generating them through offset projects.

The K-ETS employs a flexible trading period for emission permits, tailored to the specific type of permits, to ensure that emitters have ample time to comply with their obligations.

Benchmark spot allowances called Korea Allowance Unit (KAU) can be traded from the start of the compliance year until August of the following year. Other vintage years of KAUs can be traded from the date of listing until the specified vintage deadline. Credits from offset projects called Korea Offset Credit (KOC) can be traded from the date of issuance as KOC and are valid for two years (scheduled to change from 2 years to 5 years in the allocation plan released in October 2023). Other types of tradable credits are the Korea Credit Unit (KCU) which are offsets generated from Korea's domestic offset crediting mechanisms scheme and credits converted from KOC and the international type of offset credits called the i-KCU and i-KOC.

On the one hand, the Ministry of Environment allocates KAUs to covered entities based on the prescribed allocation method under the ETS Act. On the other hand, the KCU and KOC credits can be obtained through implementing reduction activities. KAU, KCU, and KOC are treated as commodities and are legally binding assets that can be owned, transferred, and traded. However, the law also authorizes the Ministry of Environment to revoke all or some of the freely allocated permits in certain conditions such as a decrease in allocation plan, closure, or suspension of facilities, or if the permits were obtained through fraud activities or illegal means.

The Korean government is in the process of expanding market participation to more financial institutions and retail investors, introducing a futures market and diversifying products for emissions trading credits, including exchange-traded notes (ETNs) and exchange-traded funds (ETFs), to encourage indirect private investment, alleviate price volatility, and strengthen risk management. The government plans to implement three key tasks between 2024 and 2025 to prepare for the introduction of a futures market and diversified products for emissions trading credits: improving risk assessment indicators, establishing a trade supervision system, and conducting preliminary training on consignment trading.

Operation of the Emissions Market

The K-ETS was designed to gradually transition from a focus on establishing the system and accumulating experience in Phase 1 to an emphasis on increasing emission reductions by covered entities in Phase 2. To achieve this, the government allocated all allowances free of charge in Phase 1, applied benchmarking as an allocation method only for certain sub-sectors, and introduced flexibility mechanisms such as banking, borrowing, and offsetting. In Phase 2, the government introduced stricter banking limitations and implemented measures to activate the market through the introduction

of market makers to address problems such as the imbalance in allowance supply and demand.

Table 7: K-ETS Operation

Phase 1 (2015-2017)	Phase 2 (2018-2021)	Phase 3 (2021-2025)
• 100% free allocation • Benchmark allocation: industries (aviation, oil refining, cement) • Facility unit allocation • Increase in borrowing limit (10-15%)	• 3% paid allocation (25 industries) • BM allocation: 7 industries (Added power generation energy, industrial complex, integrated energy, waste) • Facility unit allocation • Introduction of market makers • Introduction of carryover restrictions	• 10% paid allocation (41 industries) • BM allocation: 12 industries (steel, petrochemical, wood, paper, building added) • Allocation by business site • Expansion of market makers (7 companies) • Third-party (securities company) market participation

Source: Korea Environment Corporation (2021)

The Korean government's ETS Masterplan for Phase 3, published in December 2019, outlines a comprehensive strategy to achieve Korea's NDC by further developing allocation methods, encouraging substantial reductions in GHG emissions, and expanding market function. The Phase 3 ETS Allocation Plan, published in September 2020, provides specific measures to implement these strategies.

All ETS products can be traded in the KRX and the OTC markets. OTC trading is a method of trading that does not take place on an organized exchange but takes various shapes from bilateral trading via permanent structures such as broker networks.

Table 8: K-ETS Trading Method (Regular/Auction/OTC)

Transactions within the KRX		Trading outside of the KRX
Negotiated/Bilateral/ Block trading	**Auction (paid allocation)**	**OTC trading**
• Emissions* and certification performance** trading through the KRX's trading system (quotation submission system) **KAU, KCU, **KOC* **Depending on the transaction method, it is classified into competitive trading or negotiated trading*	• Auction of KAU through the KRX (quotation submission system (auction)) **Auction is once a month, on the 2nd Wednesday* • Accounts for 15% of total transaction volume (as of 01	• A method of trading through consultation between trading parties without using the emissions exchange **No transaction price/volume limit* • No direct impact on market price

***Accounts for 33% of total transaction volume (as of 01 January 2015 - 31 December 2022)* ● Participants: Companies with ETS obligations, market makers, securities firms, emission reduction business operators	January 2015 – 31 December 2022) ● Participants*: All companies except those receiving 100% free allowances **Applicable to 41 out of 69 industries in the 3rd planning period*	● Requires submission of OTC transaction report (->ETRS) ● Accounts for 52% of total trading volume (as of 01 January 2015 – 31 December 2022) ● Participants: companies with ETS obligations, emission reduction business operators

Source: Korea Environment Corporation (2021)

There are limitations to the types of products that can be traded in the market, depending on the types of traders, giving ETS-covered companies the most privileges as they can trade KAU, KCU, and KOC. Meanwhile, market makers and third-party financials can only trade KAU and project developers can only trade KOC. Trade restrictions on the types of products that different types of traders can trade, give ETS-covered companies the most privileges.

K-ETS registry

Article 11 of the Act on the Allocation and Trading of Greenhouse Gas Emission Permits (ETS Act) states that "the competent authority shall maintain a register for the trading of emission permits to register and manage the allocation and trading of emission permits, GHG emissions from each business entity eligible for allocation". The emission permit register shall be managed and operated by the "competent authority" and shall register the total number of allowances by commitment period and compliance year and GHG emissions, as well as information of account holders. The law states that the register shall be managed in electronic format and linked to the national integrated information system of GHGs. Likewise, the law under Article 31 of the ETS Act specifies that a separate offset registry shall be established and maintained to register and manage GHG reductions certified from an external project. The offset registry shall be linked to the emission permit registry.

The GIR manages both the ETRS and the ORS. The ETRS is a registry for the trading of emissions permits. The ETRS records the allocation and trading of allowances from each ETS-covered entity. This helps to ensure the transparency and integrity of the emissions trading market. The ORS is a registry for offset credits to store and track the offset credits generated by projects that reduce GHGs outside of the ETS. ETS-covered entities can use offset credits to comply with part of their emissions obligations.

The Korea Environment Corporation (K-eco) assists the government in policy and market research, environmental feasibility studies, and management of ETS-covered companies.

Market Monitoring and Oversight

The Korean government has expanded participation in the carbon market to non-compliance entities, in the form of domestic financial intermediaries, from 2021. As of 2023, 21 financial intermediaries can trade allowances and offset credits[10] on the KRX.

Korean law does not explicitly define the legal status of KAUs, but it applies certain provisions of financial market law to KAUs to prevent market price manipulation and unfair trade.

For example, provisions of regulating information exchange and preventing price manipulation specified under Article 22 Paragraph 3 of the ETS Act states that Article 176 of the 'Capital Market and Financial Investment Business Act' will be applied. Article 176 (1), (2), and the part other than the subparagraph of (3), Articles 177 of the Financial Investment Services and Capital Markets Act (limited to cases where Article 176 (1), (2), and the part other than the subparagraph of (3) of the Financial Investment Services and Capital Markets Act is violated) through 179, and Article 383 (1) and (2) shall apply mutatis mutandis, respectively, to the prohibition of, and liability for, market price manipulation, prohibition of, and liability for, fraudulent transactions, and prohibition of the use of information in relation to transactions in an emission permits exchange. In such cases, the term "listed securities or exchange-traded derivatives" shall be construed as "emission permits", the term "electronic securities brokerage company" as "company brokering transactions of emission permits', the term "exchange" as "emission permits exchange", and the term "financial investment business entities and institutions involved in financial investment business" as "members of an emission permits exchange", respectively" (Article 22(3), the "Emissions Trading Act").

Current regulations limit financial institutions to holding a maximum of 1 million tons of carbon allowances throughout a phase to prevent them from accumulating excessive market share.

Market stability mechanism

The law gives the government the ability to increase the supply of allowances or set a price corridor if sudden price changes disrupt market activity. Under Article 23 of the ETS Act, the Ministry of Environment may take measures to stabilize the prices under certain conditions through allocating additional allowances from the reserves, setting holding limits, limiting banking, and borrowing amounts, limiting the use of offset credits, or setting price floor or price ceilings, subject to the review of the Allowance Committee.

Inter-linkage with other ETS

South Korea is open to linking with other systems, however, no linkage opportunities have been discussed at present.

[10] Financials trading carbon offsets should be separately registered as 'emission reduction business operator'

II.3.4.3. Institutional set-up

The operating institutions of the K-ETS play an essential role in the effective implementation of the system. The K-ETS institutions include the Ministry of Environment, KRX, K-eco, and GIR. These institutions also work together to develop and implement new policies and programs related to the ETS. Other market stakeholders, also called market participants, are involved in the ETS, such as the ETS-covered entities, offset project developers, and financial institutions.

Ministry of Finance

The details of the K-ETS were expounded in the Master Plan for the Emissions Trading Scheme, prepared by the Ministry of Finance, and the Phase I National Allowances Allocation Plan, prepared by the Ministry of Environment.

From the outset of the K-ETS, the Ministry of Environment was responsible for managing all aspects of the scheme's operation. However, in June 2016, an amendment to the ETS Act was introduced, resulting in a restructuring of the ETS oversight with the Ministry of Finance assuming overall system operation and support of the Korean carbon market, while four sectoral ministries (Ministry of Trade, Industry and Energy, Ministry of Land and Infrastructure Transport, Ministry of Environment, and Ministry of Agriculture, Food and Rural Affairs) assumed responsibilities related to allowance allocation, compliance, and communication with participants.

The restructuring of the K-ETS governance in 2016 was driven by the need to balance emission reductions with economic growth and industrial competitiveness. Korea's economic model places high importance on export- and manufacturing-oriented economic growth. By assigning responsibilities to dedicated industrial ministries, the Korean government was able to adopt a more holistic approach to policy development and ensure that the K-ETS was aligned with Korea's 2030 NDC target of 37% emissions reduction.

In June 2017, the Ministry of Finance released its second master plan for the K-ETS, which gave direction to how the system would change in Phase II. However, from Phase II onwards, the K-ETS oversight was considerably restructured again to re-consolidate responsibilities with the Ministry of Environment, which has taken on extended responsibilities for the operation of the K-ETS and the overall achievement of Korea's national GHG emission reduction target.

Going forward, the updated K-ETS master plans will be developed through the cooperation of the Ministry of Environment and the Ministry of Finance. The Ministry of Finance is responsible for K-ETS basic plan development, with the Ministry of Environment having sole responsibility for the K-ETS allocation plan, including supervision of the Allocation Decision Review Committee and the GHG Emission Committee.

Ministry of Environment

The Ministry of Environment is the competent authority for the K-ETS, responsible for developing and implementing the system's regulations. This includes setting the overall goals of the ETS, designing the emissions trading market, and developing rules for the allocation and trading of emissions permits. The Ministry of Environment also allocates emissions permits to ETS-covered entities. In addition, the Ministry of Environment is responsible for monitoring and reporting emissions data from ETS-covered entities. This data is used to track compliance with the ETS regulations and to develop new policies and programs. The Ministry of Environment supervises GIR and K-eco, two organizations that play equally important roles in the K-ETS.

Greenhouse Gas Inventory and Research Center

GIR is a research institute under the Ministry of Environment established in 2010. GIR is responsible for developing and maintaining the national GHG inventory, which tracks Korea's GHG emissions from all sources. The institute provides data and analysis to the government and other stakeholders to support the development and implementation of the K-ETS. GIR also conducts research on GHG mitigation technologies and policies. This research helps to inform the government's decision-making on the ETS and other climate change mitigation measures. In addition, it plays a role in raising awareness of the ETS and its benefits through organizing workshops and seminars and publishing ETS educational materials on the system.

Korea Environmental Corporation

K-eco is a public organization established in 1985 under the Ministry of Environment for the purpose of contributing to sustainable development and environmental protection. K-eco provides support to ETS-covered entities and offset project developers, conducting research and analysis, and raising awareness of environmental issues that promote the reduction of GHG emissions and the transition to a low-carbon economy. In addition to its work on climate change, K-eco works on a range of other environmental issues, such as air quality, water quality, and waste management.

As the responsible agency for managing the technical concerns of obligated entities, verifying emissions statements, and validating regulatory compliance, K-eco plays a vital role in supporting the Ministry of Environment in matters related to the allocation/cancellation of allowances.

Korea Exchange

KRX is South Korea’s sole centralized exchange established in March 1956, operating three equity trading markets: the Main Board (KOSPI), the Korean Securities Dealers Automated Quotations (KOSDAQ) market, and the Korea New Exchange (KONEX) markets. KRX has been contributing to the development of the Korean economy by providing corporations with capital and growth and offering individuals opportunities for wealth accumulation. The KRX Emissions Market, a part of the derivatives division’s commodity part, opened on 12 January 2015.

Other stakeholders

Market stakeholders are composed of compliance firms, project developers, market makers, and financial institutions. Compliance firms, sometimes called 'obligated entities', are companies that are annually emitting more than 125,000 tCO_2e or facilities that are annually emitting more than 25,000 tCO_2e and are legally required by law to participate in the ETS. Project developers or 'emission reduction business operators' are companies that implement emission reduction activities that generate offset credits. Market makers are financial firms such as banks and securities firms that are contractually obligated by the Ministry of Environment to provide liquidity to the market, while securities firms, otherwise called 'third party financials' are non-obligated trading parties that can buy and sell allowances within the allowed holding positions.

Overall, the institutional framework in K-ETS is demonstrated in the figure below.

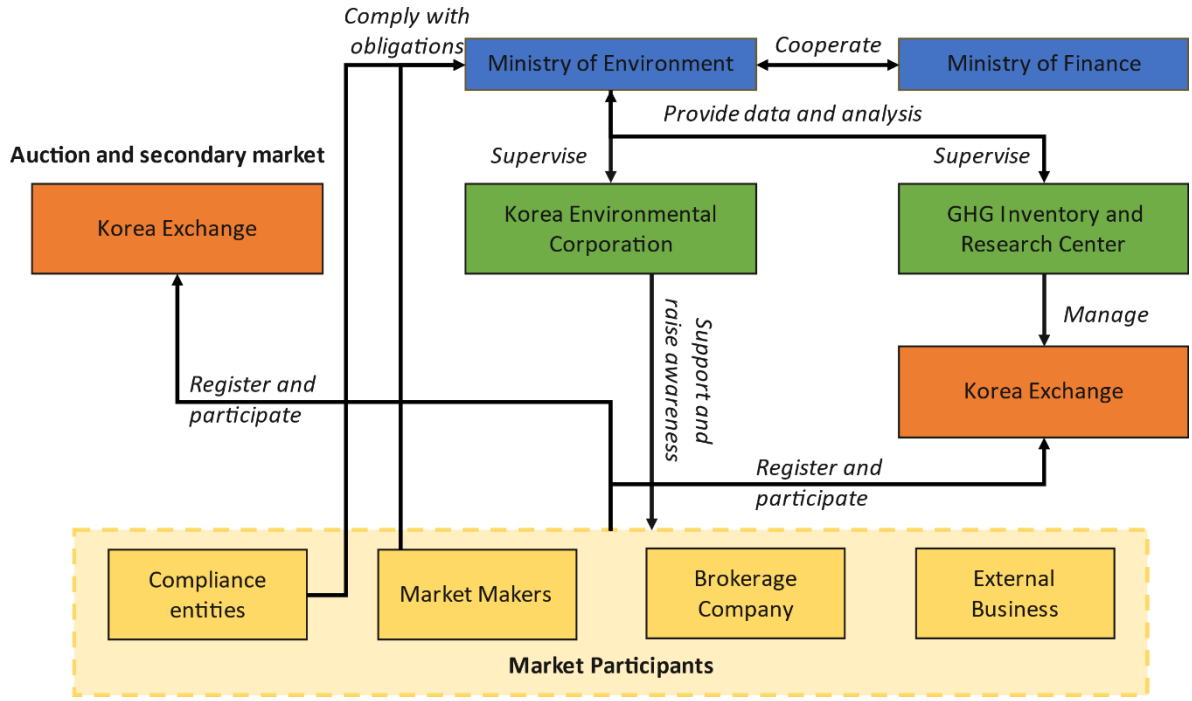

Figure 29: Institutional arrangements in the K-ETS

Source: Korea Exchange (2021)

II.3.4.4. Infrastructure

Under K-ETS, transactions are facilitated through two registries: (i) ORS and (ii) ETRS.

ORS is a public registry that records information on carbon offset projects, including project plans, certification records, and other relevant information, to facilitate the issuance, transfer, and disposal of offset credits. A number of its functions include:

- Recording and managing external business applications, feasibility assessment, registration, monitoring, verification, certification, etc.;
- Recording and managing the issuance, transfer, and disposal of external business certification performance and conversion to offset credits, etc.;
- Other functions deemed necessary by the Minister of Environment.

The figure for the ORS Operation Structure is provided in Annex 4 for a more comprehensive visual understanding.

Under the ORS, there are several accounts which are demonstrated in the table below.

Table 9: Account types under the ORS in the K-ETS

No.	Account Type	Description
1	Issuance Account	Issues certified credits derived from a project (maintains one independent account for each project)
2	Holding Account	Keeps the certified credits of a project participant (allocates one independent account for each project participant)
3	Cancellation Account	Records transferred credit cancellation transferred from a Holding Account (Supervised by the Ministry of Environment)
4	Offset Credit Account	Hold KCUs obtained by ETS Compliance entities (maintains one independent account for each ETS compliance entity)
5	Forest Deposit Account	Allocate a specific portion of emission reductions from forest projects to prevent the loss of CO_2 in the forest sector
6	Disposal Account	Manages the disposal of certified credits obtained by ETS Compliance entities post-transfer to KCUs

Source: ICAO (2018)

ETRS is a registry for the trading of emissions permits under the ETS. It is responsible for recording and maintaining the following data, among others:

- Total number of emissions permits by commitment period and compliance year;
- Account of emission permits under the name of each business entity eligible for allocation and other private person or corporation and the number of emissions permits they each hold;
- Account for the management of emission permits in reserve (additional allocation of emission allowances, market-making activities, market stabilization reserves, etc.);
- Amount of emission permits transferred/canceled;
- Quantity of emission permits submitted;
- The carryover/borrowing amount of emission permits;
- The quantity of offset credits;
- The emission plan and verification report.
- The total number of emissions permits by commitment period and compliance year, GHG-certified emissions.

The figure illustrating the ETRS Operation Structure is enclosed in Annex 4 for further visual reference.

Overall, emission permit trading and auction are recorded in ETRS, while offset credit trading is recorded in ORS. Thus, the following sections discuss further critical components of the CTX infrastructure for the K-ETS: (i) Infrastructure required for offset

projects under ORS; (ii) The infrastructure required for auctions under ETRS; (iii) The infrastructure required for the secondary market under ETRS and ORS.

The infrastructure required for offset projects under ORS

Under the ORS framework, project participants are required to apply for KOC issuance through their issuance accounts. Subsequently, the project registration and certification process are conducted by the relevant sector's Ministry and the Ministry of Environment through ORS. Upon qualification, KOCs are issued and transferred to the project participant's holding account. For compliance entities seeking to convert KOCs to KCUs to meet compliance obligations, the process involves applying for the KCU transfer. Following approval, KOCs are transferred from the compliance entities' holding account to the disposal account. Then, they are transferred to the compliance entities' offset credit accounts, completing the process. Overall, the infrastructure required for offset projects is illustrated in the figure below.

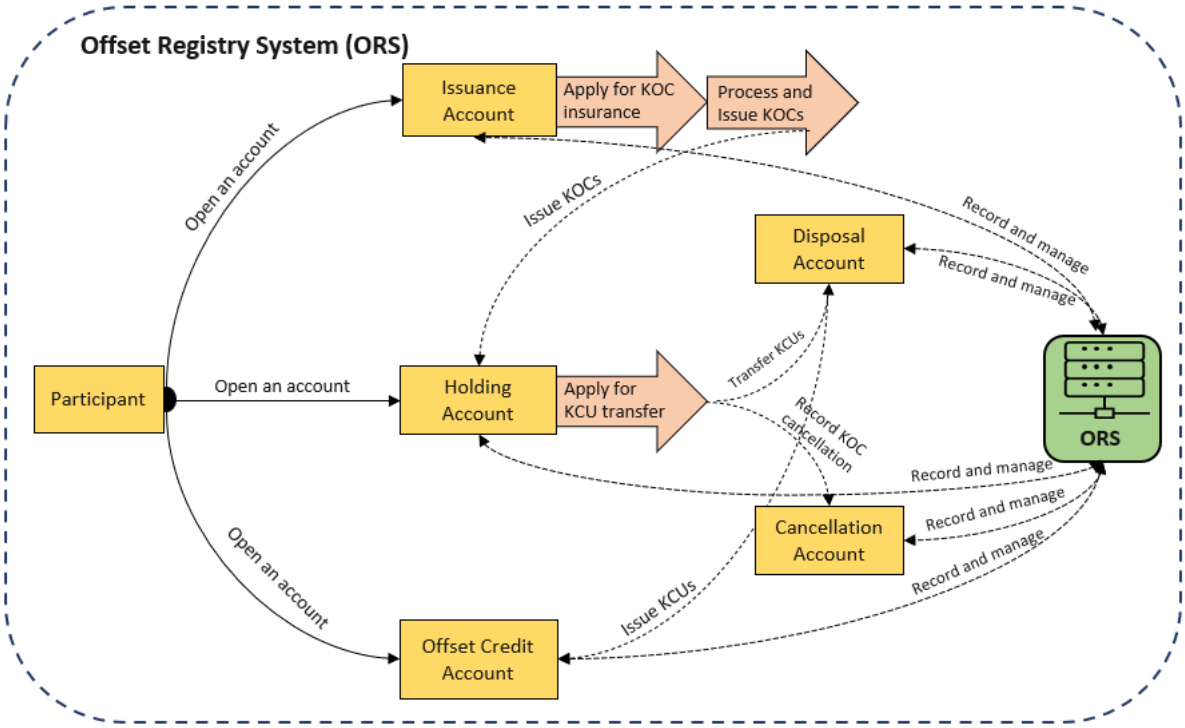

Figure 30: Infrastructure required for offset projects in the K-ETS

Source: Compiled by the Consultant based on ICAO (2018)

The infrastructure required for auctions under ETRS

KAU auctions are facilitated through KRX. To participate in an auction, a participant must possess active ETRS and KRX accounts. Participants eligible for auctioning under Article 2, Paragraph 2 of the ETS Act gain access to conduct auctions through the KRX platform.

Representatives of qualified bidding entities then submit their bids. Bidding is processed electronically through the KRX's quotation input program. The minimum bid quantity is 1,000 tons and the bidders can submit one bid price. The maximum successful bid quantity for each allocated company participating on the auction date shall be between

15% and 30% of the total volume of offer for sale (in Phase 3, the maximum bid was set at 15%). A lower bid price to ensure a fair auction price for allowances is set by the Minister of Environment and the lower limit is not announced. Bids that do not reach the lower limit will be invalidated. The Auction Administrator manages the process of determining the settlement price, ranking qualified bids from the highest to the lowest. KAUs are granted to participants, commencing from the highest qualified bid price, and moving to lower qualified bid prices until either all available allowances are allocated, or all qualified bids are fulfilled.

Then, qualified bidders proceed to conclude the financial settlement process for all awarded KAUs. After the completion of the financial settlement and distribution of auction proceeds, KAUs from the auction platform account are transferred to the successful bidders' accounts. These KAUs are subsequently moved from the auction platform account to the participant's account. The overall infrastructure required for the allowances auction is depicted in the figure below.

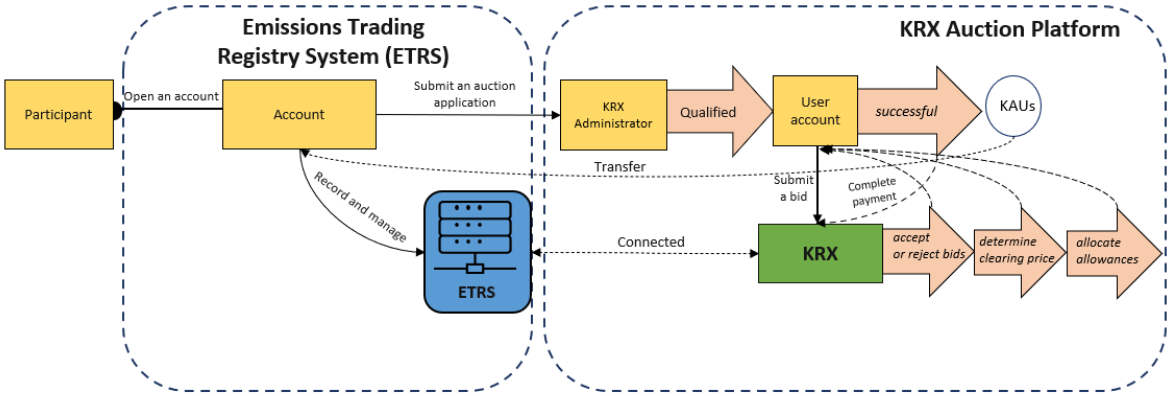

Figure 31: Infrastructure required for the KAU auction in the K-ETS

Source: Compiled by the Consultant based on ICAO (2018)

The infrastructure required for the secondary market under ETRS and ORS

In the KETS framework, participants can engage in trading KAUs, KOCs, and KCUs through the secondary market. Notably, transactions involving KAUs and KOCs are registered through ORS, while KAUs trading is recorded via ETRS. The secondary market includes two platforms: an exchange-based platform facilitated by KRX or OTC transactions (ICAP, n.d.-a).

For OTC trading within both ETRS and ORS, sellers must access their accounts within ETRS or ORS and submit a transfer request. Buyers then proceed to accept this transfer from the seller to complete the transaction.

Concerning exchange-based trading within both ETRS and ORS, sellers initiate the process by transferring KAUs/KOCs/KCUs to the KRX account. Simultaneously, buyers transfer their payment into the KRX account. Subsequently, the KRX account facilitates the clearing and settlement process. Ultimately, KAUs/KOCs/KCUs and payment are transferred to the respective accounts of buyers and sellers.

Overall, the infrastructure required for trading in the secondary market under ORS and ETRS are illustrated respectively in the figures below.

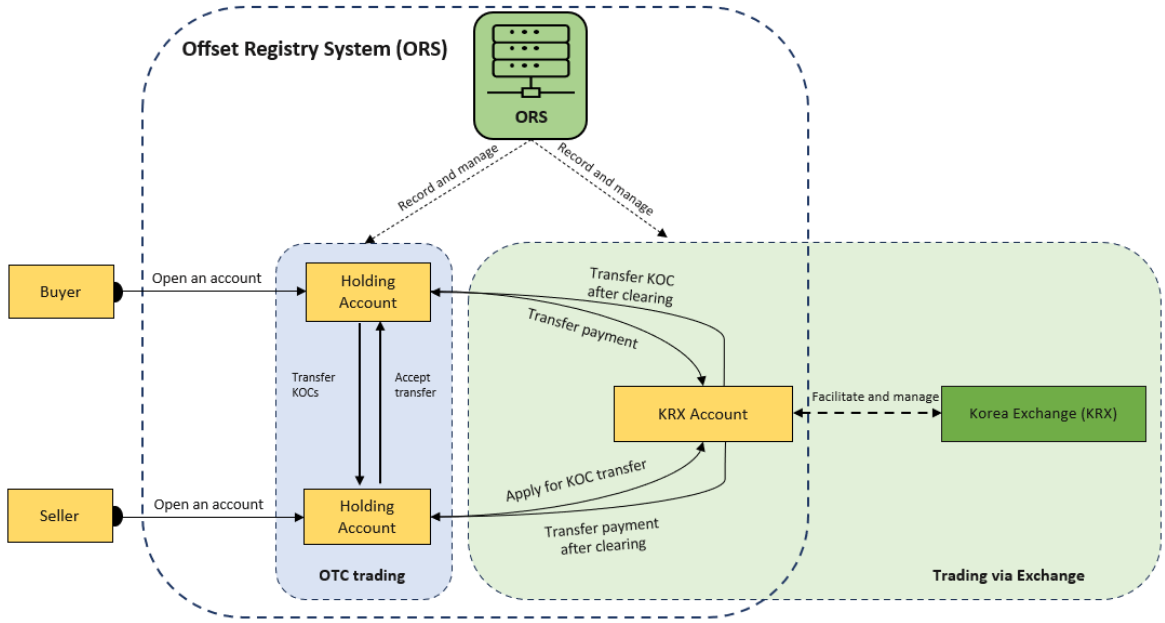

Figure 32: The infrastructure required for trading in the secondary market under ORS in the K-ETS

Source: Compiled by the Consultant based on ICAO (2018)

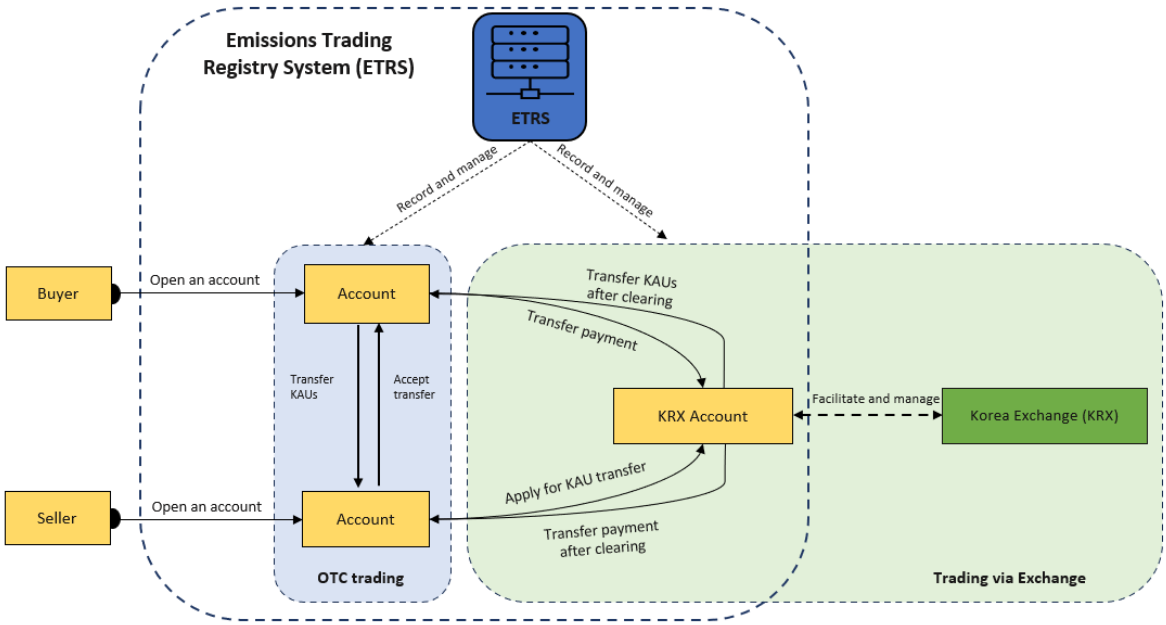

Figure 33: The infrastructure required for trading in the secondary market under ETRS in the K-ETS

Source: Compiled by the Consultant based on ICAO (2018)

The K-ETS relies on the KRX trading infrastructure, which is designed to be scalable, reliable, secure, and compliant with all applicable laws and regulations. It is also

integrated with KRX's existing stock trading systems, allowing traders to easily access and trade carbon credits. Additional information on the KRX carbon credit trading infrastructure is attached in Annex 6.

Overall, the figure below shows a refined summary of the necessary infrastructure for CTX within K-ETS.

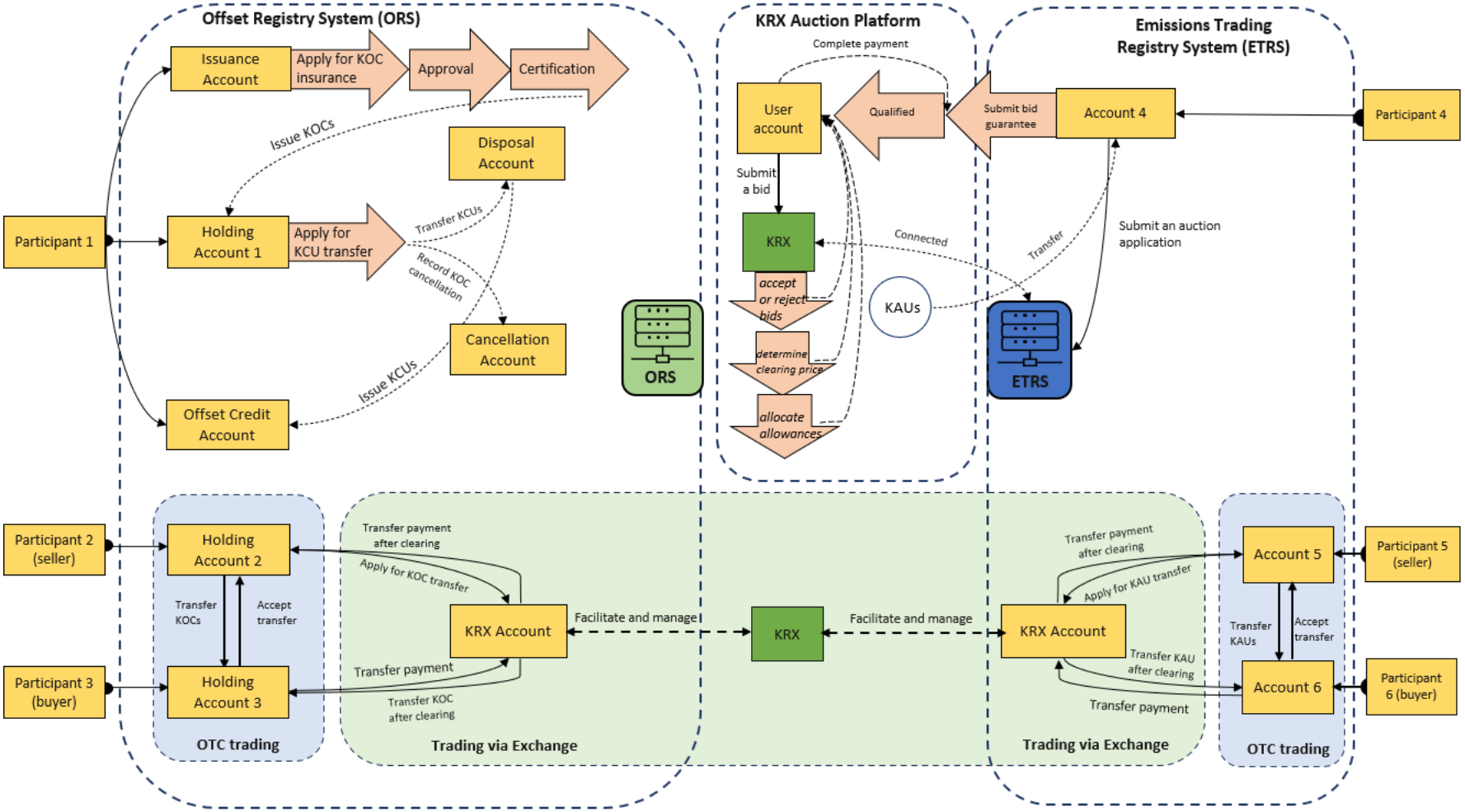

Figure 34: Overall CTX infrastructure in the K-ETS

Source: Compiled by the Consultant (2023)

II.3.4.5. Implementation challenges and solutions

During the implementation period, K-ETS faced implementation challenges regarding market volatility and regulatory uncertainty, stemming from a combination of factors:

- Disaggregated system management and oversight – unclear and inconsistent policy signals arose from the division and aggregation of responsibility among various government bodies, creating regulatory uncertainty and conflicting policy signals.
- Unrestricted allowance holding - the ability of companies to carry over surplus allowances discouraged trading, leading to low liquidity, and suppressing price discovery, especially in the early stages of the system.
- Limited market participation - Restricting participation to compliance entities fueled seasonal trading patterns and exacerbated market volatility, hindering efficient emissions reduction.
- Inefficient allocation method - the use of a purely grandfathering allocation method in the initial phases resulted in a historical oversupply of allowances, further weakening market dynamics.

Addressing these problems required providing certainty in the overall policy direction, and in turn, spurred the development of robust compliance measures, enhanced market surveillance mechanisms, and effective risk management strategies to mitigate volatility and ensure regulatory adherence. Additionally, the importance of strong institutional capacity, coupled with active stakeholder engagement, emerged as crucial for effective exchange and market management, promoting an inclusive and transparent system.

K-ETS addressed its challenges by establishing clearer policy direction, fostering robust compliance measures and market surveillance, and prioritizing strong institutional capacity with active stakeholder engagement.

II.3.5. Summary and implications for Viet Nam

The following table summarizes and compares the typical features of the selected country/jurisdiction case studies for the establishment and operation of the CTX in Viet Nam.

Table 10: Summary and comparison of country/jurisdiction case studies

	NZ ETS	K-ETS	UK ETS	California ETS
Start of Operation	2008	2015	2003	2012
Legal aspects				
Key legal framework	Climate Change Response Act 2002	Framework Act on Low Carbon Green Growth (2015) Framework Act on Carbon Neutrality and Green Growth for Coping with Climate Crisis (2021)	Climate Change Act 2008	AB 32 Global Warming Solutions Act of 2006
ETS legal framework	Climate Change Response (Emissions Trading) Amendment Act 2008	Act on the Allocation and Trading of Greenhouse Gas Emission Permits	Greenhouse Gas Emissions Trading Scheme Order 2020	California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms
CTX legal framework	Climate Change (Auctions, Limits and Price Controls for Units) Regulations 2020	Enforcement Decree of the Emissions Trading Act	Greenhouse Gas Emissions Trading Scheme Order 2020	California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms
Institutional aspects				
Market Monitoring and Oversight	Ministry of Environment - Regulatory framework Environmental Protection Authority – registry and compliance	Ministry of Environment – overall market oversight and regulatory framework Ministry of Finance – lead the allocation committee (composed	UK ETS Authority – national market oversight Each regulatory body of UK nations - compliance	California Air Resources Board – market oversight and regulations

	NZ ETS	K-ETS	UK ETS	California ETS
	Ministry of Primary Industries – forestry sector of the ETS	of related ministries) in setting ETS cap Greenhouse Gas Inventory and Research Center – registry management		
CTX operation	NZX & EEX- platform and trading oversight	KRX – platform and trading oversight	Recognized auction platform, currently the InterContinental Exchange – trading oversight	Western Climate Initiative – operation of auctions and registry management
Market Participants	Mandatory entities, voluntary entities	Compliance entities, limited financial entities	Compliance entities, non-compliance parties, financial entities	Compliance entities, non-compliance parties, financial entities
Market structure & infrastructure				
Market structure	Primary – auction Secondary – spot, forward *Carbon credits developed through eligible domestic removal activities are treated as NZUs and can be used for compliance	Primary – auction Secondary – spot, offset credits *Offset credit usage has quantitative and qualitative limitations	Primary – auction Secondary – spot, futures, options *No offset credits allowed but CORSIA offsetting and use of carbon removals under consideration	Primary – auction Secondary – spot, futures, options, offset credits *offset credit usage has quantitative and qualitative limitations
CTX(s)	NZX/ EEX – primary Several trading platforms are available for the secondary market	KRX – primary and secondary	ICE – primary and secondary	WCI, Inc. Auction Platform – primary ICE, CME, Nodal Exchange - secondary
Key infrastructure	Emission trading register Auction platform	Offset registry system Emission trading registry system Auction platform	Emission Trading Registry Auction platform	ETS registry (CITSS) Offset project registry Auction platform

	NZ ETS	K-ETS	UK ETS	California ETS
	Decentralized secondary trading platforms Resettlement and clearing infrastructure	Exchange-based secondary trading platform Resettlement and clearing infrastructure	Exchange-based secondary trading platform Resettlement and clearing infrastructure	Decentralized secondary trading platforms Resettlement and clearing infrastructure

Source: The Consultant (2023)

The key observations of the case studies are summarized in the following aspects.

In terms of legal aspects, a robust regulatory framework emerges as the cornerstone of a credible carbon trade exchange, as evidenced by all four international case studies. Each country established its exchange under a dedicated law, supported by comprehensive regulations and guidelines governing allowance trading, market oversight, and participant compliance. While the law sets high-level implementation power and enforcement for the ETS, there is also flexibility in the under-law regulations to allow the system to adjust over the implementation period(s). Aligning this framework with international standards further bolstered transparency and market integrity. In all four case studies, the establishment of the CTX was regulated in an under-law regulation, and the commodities traded on the CTX, i.e., allowances (and carbon credits) are considered as financial instruments (UK, New Zealand) or subject to regulations for the financial market (Korea, California).

Regarding institutional setup, in all four case studies, the Ministry of Environment plays the most important role in monitoring and overseeing the ETS and the CTX. Depending on inter-ministerial relationships, collaboration with the Ministry of Finance, key sectoral-in-charge authorities, and other relevant institutions is required.

The market structure in all four case studies includes a primary market that operates for the auctioning of allowances and a secondary market that operates for the trading of allowances and carbon credits. Notably, none of the countries opted for creating a new exchange, instead leveraging existing financial platforms within their jurisdictions. While California utilized the WCI program as an auction platform, the remaining countries conducted auctions through designated carbon trade exchanges. Additionally, the secondary market structure varied, with California and New Zealand featuring multiple platforms, while Korea and the UK employed a single exchange model. While all the exchanges in the four case-studies serve the primary functions to enable trading in the compliance market, the exchanges also cover transactions in the voluntary carbon market. The transactions in the voluntary carbon market are not strictly regulated in all of the four case studies since carbon credits are usually considered normal commodities, while allowances are assets created by the Government. Besides the exchanges, i.e., auctioning platform and secondary trading platform(s), the emission trading registry and the resettlement and clearing house are the most important infrastructure for the ETS and operate in connection to the CTX.

Despite current market independence, all four case studies demonstrate either past experience or legal provisions for international market linkages, suggesting a proactive approach toward global connectivity. This forward-thinking stance positions these markets for future integration and collaboration.

However, the case studies also revealed implementation challenges, ranging from market volatility and oversight issues to regulatory gaps. These challenges, in turn, spurred the development of robust compliance measures, enhanced market

surveillance mechanisms, and required effective risk management strategies to mitigate volatility and ensure regulatory adherence. Additionally, the importance of strong institutional capacity, coupled with active stakeholder engagement, emerged as crucial for effective exchange and market management, as well as for promoting an inclusive and transparent system. Viet Nam can learn from their rich experiences ranging from the case-studies to create a reliable and robust governance and policy framework, follow a cost-effective and efficient institutional arrangement approach and infrastructure to establish the CTX and the carbon market, and foresee and prepare solutions in advance to ensure seamless market operation.

III. TASK 4: REVIEW OF NATIONAL CONTEXT AND ASSESSMENT OF EXISTING RELEVANT REGULATIONS, INSTITUTIONS AND INFRASTRUCTURE FOR ESTABLISHMENT AND OPERATION OF THE CTX

In certain countries, CTX operations closely resemble those of the securities exchange (e.g., KRX, NZX) or commodities exchange (e.g., EEX, ICE). Consequently, when assessing the national context and evaluating the CTX, it is crucial to examine the pre-existing regulations, institutions, and infrastructure that pertain to the carbon market, securities exchange, and commodities exchange. Therefore, the review of the national context and assessment of existing relevant regulations, institutions, and infrastructure for the establishment and operation of the CTX will comprehensively encompass aspects of the carbon market and CTX, securities exchange, and commodities exchange to ensure a thorough and comprehensive analysis.

III.1. Viet Nam's emission profile and low-carbon direction

According to the latest available Biennial Update Report (BUR) submitted by Viet Nam to the United Nations Framework Convention on Climate Change (UNFCCC) in 2021, the total emissions in the country exceeded 317.7 million tCO_2e in 2016, including the Agriculture, Forestry, and Other Land Use (AFOLU) sector. As shown by the following graph, the main contributor was the energy sector accounting for 65% of the total emissions, followed by the Industrial Processes and Product Use (IPPU) with almost 15% of the total emissions.

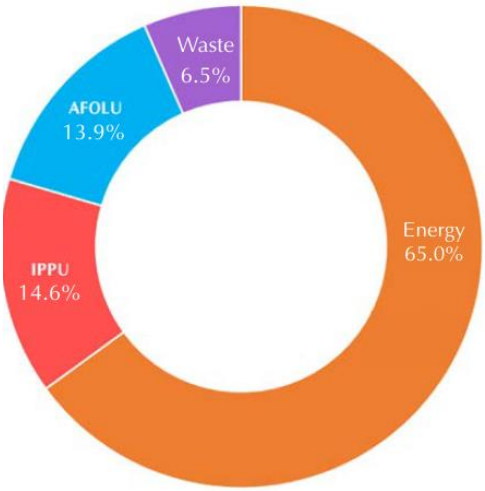

Figure 35: Share of total GHG emission in Viet Nam in 2016 by sector

Source: MONRE (2020)

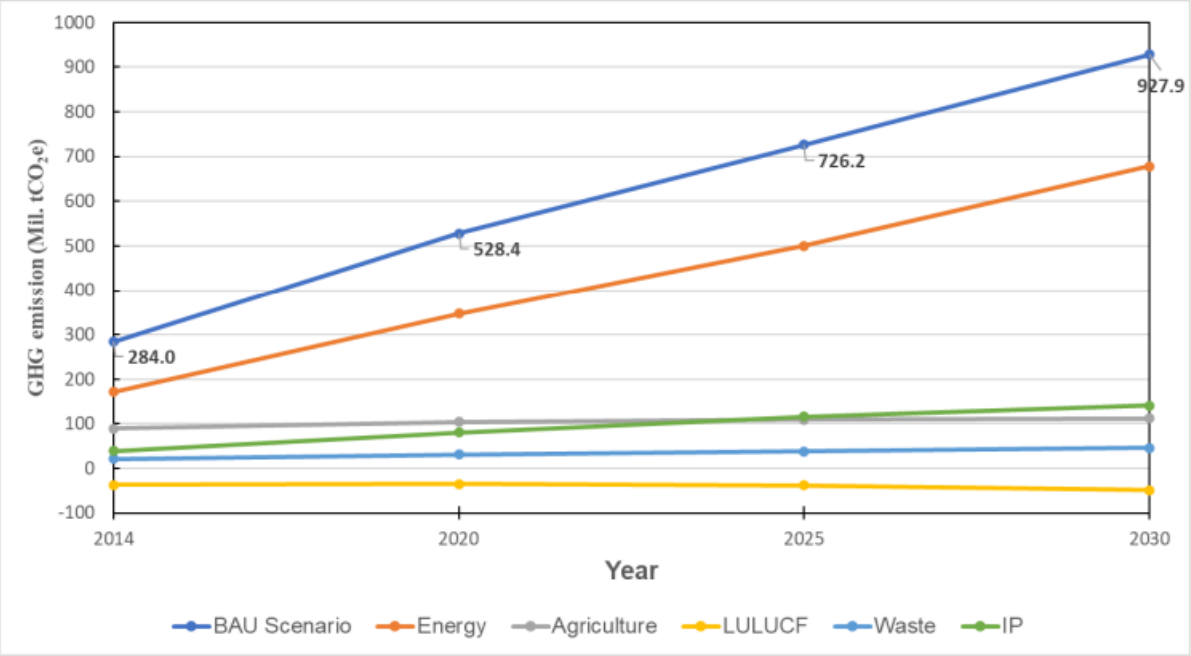

Figure 36: GHG emissions under the BAU Scenario

Source: The Government (2022)

Viet Nam ratified the Paris Agreement on 31 October 2016 and has updated its NDC twice. Viet Nam submitted the second updated NDC on 08 November 2022. Details are shown in the table below.

Table 11: Summary and comparison of country/jurisdiction case-studies

NDC version	Submission date	Country's BAU Scenario in 2030	Emission reduction mitigations by 2030	
			Unconditional (% of BAU)	Conditional (% of BAU)
Intended NDC[11]	30 September 2015	787.4 $MtCO_2e$ (base year 2010; ex. Industrial Processes)	8%	25%
First Updated NDC[12]	11 September 2020	927.9 $MtCO_2e$ (base year 2014)	9%	27%
Second Updated NDC[13]	08 November 2022	927.9 $MtCO_2e$ (base year 2014)	15.8%	43.5%

Source: NDC Registry (2023)

11 https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Viet%20Nam/1/VIETNAM'S%20INDC.pdf

12 https://unfccc.int/sites/default/files/NDC/2022-06/Viet%20Nam_NDC_2020_Eng.pdf

13 https://unfccc.int/sites/default/files/NDC/2022-11/Viet%20Nam_NDC_2022_Eng.pdf

III.2. Legal framework for establishment and operation of the CTX

III.2.1. Legal framework for the carbon market and CTX in Viet Nam

The current experience in Viet Nam related to the carbon market is mainly with international carbon crediting mechanisms, of which, the most prominent is CDM under the Kyoto Protocol. To implement the Kyoto Protocol and facilitate the CDM projects, a number of Decisions and Circulars were issued by the Prime Minister, MOF and the Ministry of Natural Resources and Environment (MONRE) from 2007 (Decision No. 130/2007/ND-TTg dated 02 August 2007 on financial mechanisms and policies for investment projects under the CDM; Inter-ministerial Circular No. 58/2008/TTLT-BTC-BTMT dated 04 July 2008 (later revised with the Inter-ministerial Circular No. 204/2010/TTLT-BTC-BTMT) to provide further guidance for the implementation of this Decision; Circular No. 12/2010/TT-BTNMT dated 26 July 2010 (later revised with Circular No. 15/2011/TT-BTNMT dated 28 April 2011 and Circular No. 15/2014/TT-BTNMT dated 24 March 2014)).

With the failure of the international community to conclude the second phase of the Kyoto Protocol, Viet Nam participated in a bilateral carbon crediting mechanism with Japan called the Joint Crediting Mechanism (JCM) to promote low-carbon technology transfer between the two countries. To facilitate JCM, MONRE issued Circular No. 17/2015/TT-BTNMT dated 06 April 2015, to guide the development and implementation of JCM projects in Viet Nam.

The development of the domestic carbon market in Viet Nam was highlighted by the Prime Minister Decision No. 1775/2012/QD-TTG on Approval of the Scheme for the Management of GHG Emissions and Carbon Credit Trading in the World Market dated 21 November 2012. It was then re-stated in Decision No. 2053/2016/ND-TTg on the plan for implementation of the Paris Agreement of the Prime Minister in 2016 as a priority task for GHG emission reductions in the 2016-2020 period. However, it was not until the promulgation of LEP 2020, that the domestic carbon market of Viet Nam was officially regulated in detail.

In Article 91 of the LEP 2020, seven GHGs are identified and the organization and development of the domestic carbon market are defined as one of the measures for GHG emission reduction effort in Viet Nam, for which MONRE is responsible for the following (National Assembly, 2020):

- Developing and submitting to the Prime Minister for approval of the list of sectors and facilities subject to mandatory GHG inventory; promulgating the national GHG inventory system; the MRV system for GHG emission reductions;
- Developing the national GHG inventory report biannually;
- Providing guidance and organizing the validation of GHG inventory results and GHG emission reduction plan for sectors and facilities subject to mandatory GHG inventory.

Specifically, Article 139 of the LEP provides details about the organization and development of the domestic carbon market, including the following (National Assembly, 2020):

- Scope: Viet Nam's national carbon market covers the exchange of GHG emission allowances and carbon credits obtained from domestic and international emission trading schemes and offset mechanisms in accordance with regulations of law and international treaties.
- Participants: Facilities subject to mandatory GHG inventory shall be allocated with allowances that can be traded in the domestic carbon market.
- Basis for allocation of allowances: include 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.

The Article also defines the specific responsibilities of different stakeholders in the domestic carbon market as follows:

- The Government: to provide details for the costs for allocation of allowances, roadmap, timeline for implementation of the domestic carbon market to be in line with socio-economic conditions of Viet Nam and international treaties that Viet Nam acceded to.
- MONRE: to submit to the Prime Minister for approval of the total GHG caps for each period and annually; to organize for allocation of allowances; organize for the operation of the domestic carbon market and participation in the world carbon market.
- MOF: to preside and collaborate with MONRE, ministries, and agencies for the establishment of the domestic carbon market.
- Facilities subject to mandatory GHG inventory: to perform transactions, auctioning, borrowing, surrendering, banking of allowances and carbon credits and participate in domestic and international carbon credit trading, offsetting mechanisms in accordance with the laws of Viet Nam and international treaties that Viet Nam acceded to.

Based on the LEP 2020, the Government issued Decree 06/2022/ND-CP regulating GHG emission reductions and Ozone layer protection to provide further specific guidance for the development of the domestic carbon market in Viet Nam (The Government, 2022b).

Participants in the domestic carbon market (Article 16)

The participants in the domestic carbon market of Viet Nam include the following:

1) Facilities that are covered in the list of facilities subject to mandatory GHG inventory issued by the Prime Minister.
   These facilities include those having annual GHG emissions from 3,000 tCO_2e or above, or belong to one of the following cases:

- Coal-fired power plants and manufacturing establishments with an annual energy consumption of 1000 tons of oil equivalent (TOE) or more;
- Road transport operators with an annual energy consumption of 1000 TOE or more;
- Commercial buildings with an annual energy consumption of 1000 TOE or more;
- Solid waste treatment facilities with an annual processing capacity of 65,000 tons or more.

2) Organizations participating in domestic and international carbon credit offsetting, trading mechanisms that are in line with regulations of the laws and international treaties that Viet Nam acceded to.
3) Other organizations and individuals involved in investment, trading activities of allowances, and carbon credits in the carbon market.

Development roadmap, and timeline for implementation of the domestic carbon market (Article 17)

1) From now to end of 2027

- Develop regulations for the management of carbon credits, trading of allowances, and carbon credits; develop regulations for the operation of the CTX;
- Pilot carbon trading, offset in potential sectors and provide guidance on domestic and international carbon trading, offsetting;
- Establish and pilot operation of the CTX from 2025;
- Perform capacity building, and awareness raising on the development of the carbon market.

2) From 2028:

- Perform official operation of the CTX in 2028;
- Provide regulations on linking and trading carbon credits to the regional and world carbon markets.

Creation of traded commodities (Article 12)

1) Allocation of allowances

- MONRE will submit to the Prime Minister for the promulgation of the total GHG emissions cap, the share retained for reserve and auctioning for the 2026-2030 period and annually;
- MONRE will preside and collaborate with sector-management authorities to develop GHG emission benchmarks for products and organize for allocation of allowances for facilities for the 2026-2030 period and annually.

2) Endorsement of carbon credits and allowances to be traded on the CTX:

- MONRE will endorse the carbon credits and allowances to be traded on the CTX

Roles and functions of the CTX (Article 19)

- The trading of carbon credits and allowances is performed on the CTX;
- Facilities can participate in auctions to acquire more allowances apart from the allocated volume for the same commitment period; bank the un-used allowances to the following years of the same commitment period; borrow the allocated allowances for the following year to use in the current year of the same commitment period;
- Facilities can use carbon credits to offset their emissions. The volume of carbon credits shall not exceed 10% of the total allocated allowances for their facilities;
- MONRE will reclaim the allocated allowances in case the facilities stop operation, dissolve, or go bankrupt;
- By the end of the commitment period, facilities shall pay for the emissions exceeding the allocated allowances. Besides the payment, the exceeded amount will be subtracted from the allowances allocated for the next commitment period;
- MONRE will guide auctioning, transferring, banking, borrowing, and surrendering of allowances.

Responsibilities for the development of the domestic carbon market (Article 21)

- MOF presides for the development and establishment of CTX and promulgation of financial management mechanisms for the operation of the carbon market;
- MONRE presides and collaborates with relevant ministries for the organization of pilot operation and official operation of the CTX for management and oversight of the carbon market; provides regulations for linking CTX of the domestic carbon market to the regional and the world carbon markets; provides regulations for implementation of carbon credit trading, offsetting mechanisms; develops publications for awareness rising, implements capacity building for participants in the carbon market.

To complement Decree No. 06/2022/ND-CP, the Prime Minister issued Decision No. 01/2022/QD-TTg providing for the list of sectors and GHG-emitting facilities subject to mandatory GHG inventory. According to the Decision, a total of 1,912 facilities were listed belonging to the following four economic sectors: (i) industry and trade, (ii) transport, (iii) construction, and (iv) natural resources and the environment (NRE), i.e., waste.

The guideline MRV are promulgated for the waste management sector (Circular No.17/2022/TT-BTNMT), the forestry sector (Circular No. 23/2023/TT-BNNPTNT) and the industry and trade sector (Circular No. 38/2023/TT-BCT).

On the enforcement aspect, the Government issued Decree No. 45/2022/ND-CP dated 07 July 2022 on penalties for administrative violations in the environmental protection area, which provides the following measures for handling violations of regulations on GHG emission reductions:

- Warning for: i) failure to submit GHG inventory reports; and ii) failure to submit GHG mitigation reports.
- A fine of VND 5 million-10 million for: i) providing incorrect or insufficient information on GHG inventory reports; and ii) providing incorrect or insufficient information on GHG mitigation reports.
- A fine of VND 30 million to 50 million for: i) failure to prepare GHG inventory report; and ii) failure to prepare GHG mitigation reports.

A comprehensive list of the general legal documents and financial regulations related to the carbon market in Viet Nam is provided in Annex 6 of this Report.

III.2.2. Legal framework for the stock exchange

The general policy for development of the securities market in Viet Nam was initiated at the 7th Congress of the 7th Party Central Committee on 30 July 1994 (Ngo Tan, 2022). The Government then established the State Securities Commission (SSC) on 28 November 1996 under Decree No. 75/1996/ND-CP to function for organization and State management of the securities and the securities market (SSC, n.d.).

To create a favorable condition for the operation of the securities market, the Government promulgated Decree No. 48/1998/ND-CP on securities and the securities market which was considered the first legal document for the establishment of the securities market in Viet Nam.

The Ho Chi Minh City Securities Trading Center and the Hanoi Securities Trading Center were both established in 1998 under Decision No. 127/1998/QD-TTg of the Prime Minister.

The Ho Chi Minh City Securities Trading Center operated on 20 July 2000 and the first trading session was on 28 July 2000 with 02 listed companies and 06 securities member firms. In 2007, it was transformed into the current Hochiminh Stock Exchange (HOSE) in accordance with Decision No. 599/2007/QD-TTg of the Prime Minister and under the monitoring of MOF (HOSE, 2022b).

The Hanoi Securities Trading Center came into operation later 08 March 2005. On 02 January 2009, it was transformed and restructured into the current Hanoi Stock Exchange (HNX) under Decision No. 01/2009/QD-TTg. On 24 June 2009, HNX was inaugurated as a State-owned single-member limited liability company owned by MOF (HNX, n.d.-b).

The Viet Nam Securities Depository Center (VSD) was established on 27 July 2005 under Decision No. 189/2005/QD-TTg of the Prime Minister, which was later transformed and re-structured into the current Viet Nam Securities Depository and Clearing Corporation (VSDC).

To support the fast and stable development of the securities market, to ensure the legal benefits of investors, and to promote deep and wide integration into the international capital market, the Law on Securities (Law No. 70/2006/QH11) was promulgated in 2006

and later amended and supplemented in 2010. It was then revoked and replaced by the Law on Securities in 2019 (Law No. 54/2019/QH14). For the exchange specifically, it regulated the procedures and participants in the securities market. The organization of SSC, VSDC, the Viet Nam Exchange (VNX), and their functions and obligations are also defined. Accordingly, SSC is affiliated with MOF to support MOF in the state management of securities and the securities market, including management and supervision of VNX and VSDC. The organization and operation of the stock exchange in Viet Nam are centrally performed by VNX and the registration, depository, offsetting, and payment are centrally performed by VSDC. Over 50% of the charter capital or voting shares of VNX and VSDC belongs to the State and their establishment and operation shall be regulated by the Prime Minister upon the proposal of MOF.

On 23 December 2020, the Prime Minister issued Decision No. 37/2020/QD-TTg on the establishment of VNX. Accordingly, both HOSE and HNX became subsidiaries in which 100% of the charter capital was held by VNX.

Notably based on Circular No. 57/2021/TT-BTC of MOF on 12 July 2021 and the recent revision and amendment under Circular No. 69/2023/TT-BTC on the roadmap for re-structuring of the stock trading market, the bond trading market, the derivatives market and the trading market for other securities, HOSE will be responsible for the consolidated trading market for stocks, investment fund certificates and right certificates by end of 2026 while HNX will be responsible for the consolidated trading market for bonds and derivatives.

With the development of online services, MOF provided guidelines for e-transactions on the securities market under Circular No. 134/2017/TT-BTC.

On 31 December 2020, MOF issued Circular No. 120/2020/TT-BTC providing for the trading of listed and registered shares, fund certificates, corporate bonds and secured warrants listed on securities trading systems. The Circular gives details about securities trading accounts and procedures, including market-making transactions.

The figure below illustrates the main milestones in the legal development of the securities market in Viet Nam.

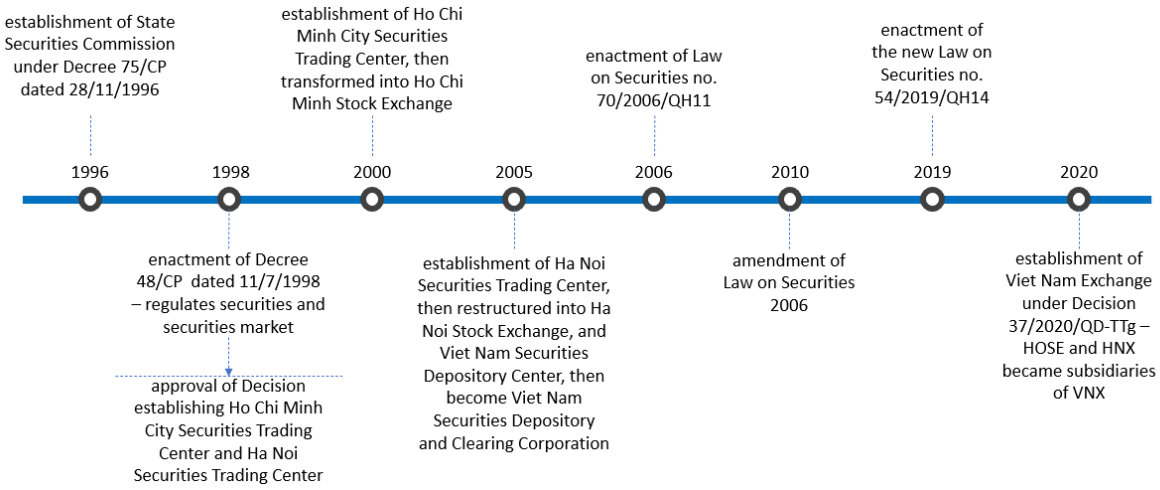

Figure 37: The main milestones in the legal development of the securities market in Viet Nam

Source: Compiled by the Consultant (2023)

Annex 7 of this Report enumerates the current effective legal documents governing the securities market in Viet Nam, forming a legal ground and reference for the carbon market and the establishment of the CTX in Viet Nam.

III.2.3. Legal framework for the commodities exchange

The trading of commodities in the commodities market is generally governed by Commercial Law, Enterprise Law, and Investment Law. Article 67 of the 2005 Commercial Law defines the functions of the commodities exchange as follows (National Assembly, 2005):

- Provide the necessary technical infrastructure conditions for trading commodities;
- Execute trading activities;
- List the specific price levels that are formed in the commodities exchange at a certain point in time.

The Law also specifies two types of contracts for the purchase and sale of commodities through the commodities exchange, which are forward contracts and call-option contracts.

The commodities exchange is specifically regulated under Decree No. 158/2006/ND-CP detailing the Commercial Law regarding commodities purchase and sale through the commodities exchange and the more recent revisions and amendments under Decree No. 51/2018/ND-CP.

Different from the stock exchange, which is strictly regulated by the Government, the commodities exchange can be any legal entity established and operating as a limited liability company or a joint-stock company that meets the following specific conditions (The Government, 2018):

1. Having the legal capital of VND 150 billion or more;

2. Having an information system that meets requirements for technology for trading in goods through good exchanges, to be specific:
    - The server system shall operate stably and there should be at least one backup server ready in the event of failures of the primary server;
    - The server system shall back up business application data, trading data and recover data in the event of failures;
    - Application software shall comply with requirements for intellectual property rights;
    - The software system shall have the ability to log trading, payment, and delivery during the business process for at least 5 years; and
    - The information system shall comply with technical regulations on cyberinformation security.

The Ministry of Industry and Trade (MOIT) is responsible for the management of commodities exchanges in Viet Nam, including receiving and verifying application documents and issuing the establishment license for the commodities exchanges.

The establishment, functions, and obligations of the clearing house and the commodities delivery center are also defined in these regulations. Accordingly, the commodities exchanges may establish their attached clearing house and commodities delivery center or authorize another organization to provide the services.

So far, the Mercantile Exchange of Viet Nam (MXV) is the only entity granted with license from MOIT and operating for trading commodities at the national level (Dinh Thanh Huong, 2023).

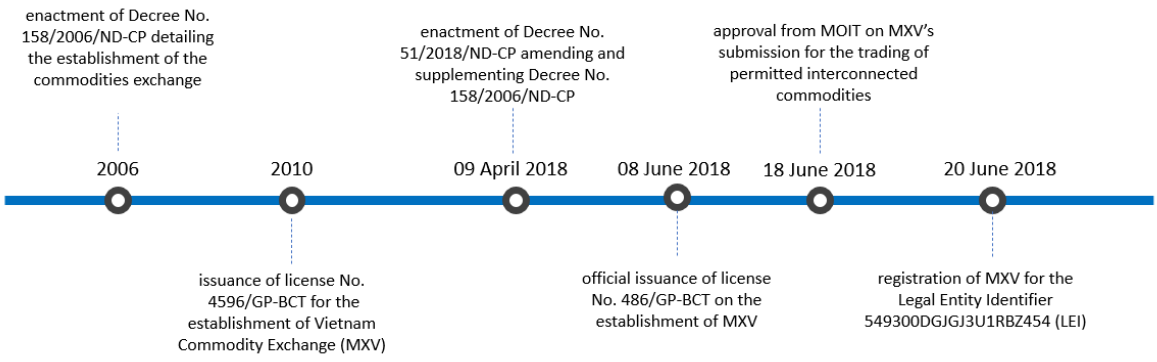

Figure 38: Development history of the Mercantile Exchange of Viet Nam

Source: Compiled by the Consultant based on VMEX (n.d.)

As of January 2023, MXV is managing 37 market members (35 trading members and 2 intermediary members) with offices and branches all over the country and over 22,000 active transaction accounts. MXV is listed for transactions of 42 products, belonging to 4 groups: i) Agriculture; ii) Energy; iii) Metal; and iv) Industrial material. The exchange is linked directly to large commodities exchanges in the world, including ICE, the

London Metal Exchange (LME), the Singapore Exchange (SGX), the Osaka Exchange (OSE), and Bursa Malaysia Derivatives Berhad (BMD) (ITR, 2023).

Apart from the commodities exchange, the Government also provides regulations on e-commerce under Decree No. 52/2013/ND-CP with amendments under Decree No. 85/2021/ND-CP. The regulations define "e-commerce website" as an electronic information page set up to serve the past or the whole process of buying and selling goods or providing services, from displaying and introducing goods or services to concluding contracts, providing services, making payments, and providing after-sale services. There are two types of e-commerce websites:

- E-commerce websites for selling: are those self-established by merchants, organizations, and individuals to serve their business promotion, selling their commodities, or providing their services.
- Websites for providing e-commerce trading services are those established by merchants, organizations, and individuals to provide the environment for other merchants, organizations, and individuals to perform their business. It includes the following types: i) e-commerce trading floor; ii) online auctioning website; iii) online promotion website; and iv) other websites defined by MOIT.

The "e-commerce trading floor" is further defined as an e-commerce website permitting traders, organizations, and individuals who are not the website owner to conduct part or the whole of the process of buying and selling goods or services on that website and does not include online securities trading. MOIT is also responsible for the State management of e-commerce in Viet Nam. The operation forms of the e-commerce trading floor include the following (The Government, 2013):

- Website allowing the participants to open online shops to display and introduce commodities or services;
- Website allowing the participants to establish sub-pages to display and introduce commodities or services;
- Website having purchase and sale sections to allow participants to post news for the purchase and sale of commodities and services.

In the case where the e-commerce website allows participants to perform purchase and sale of commodities as a commodities exchange, it is required to have an establishment license for trading commodities and to comply with legal requirements for commodities exchanges.

Current voluntary development of the self-claimed carbon trade exchanges in Viet Nam is in the form of an "e-commerce trading floor".

For an online auctioning website, it is required to have the technical system to meet the following minimum requirements (The Government, 2013):

- To record and archive all price levels being paid in one auction;

- After the start of an auction, to display the highest price and the persons who place that price every thirty (30) seconds.

III.3. Existing institutional arrangements related to the establishment and operation of the CTX

III.3.1. Current institutional arrangements for the carbon market and the CTX

As earlier mentioned in the legal review section, the institutions, and participants in the domestic carbon market of Viet Nam has been roughly defined under the LEP 2020 and Decree No. 06/2022/ND-CP as follows:

Ministry of Natural Resources and Environment

For the carbon market, MONRE is responsible for submitting to the Prime Minister for approval of the total GHG caps for each period and annually (including the portion retained for reserve and auctioning for the 2026-2030 period) and organizing for operation of the domestic carbon market and participating in the world carbon market (National Assembly, 2020).

For the CTX specifically, MONRE takes charge of the endorsement of allowances and carbon credits to be traded on the CTX. MONRE will guide auctioning, transferring, banking, borrowing, and surrendering of allowances. MONRE will preside over and collaborate with relevant ministries for the organization of pilot operation and official operation of the CTX, including allocation of allowances for and MRV of the covered-facilities. MONRE will reclaim the allocated allowances in case the facilities stop operation, dissolve, or go bankrupt. Last but not least, MONRE serves the functions of management and supervision of the carbon market; regulates relevant activities to connect the domestic CTX with regional and global carbon market; prescribes the implementation of carbon credit exchange and offset mechanisms; develops propaganda documents and carries out activities to enhance the capacity of participants involving in the carbon market (The Government, 2022b).

Ministry of Finance

MOF is responsible for presiding and collaborating with MONRE, line ministries, and agencies for the establishment of the domestic carbon market (National Assembly, 2020).

For the CTX specifically, MOF presides for the development and establishment of CTX and promulgation of financial management mechanisms for the operation of the carbon market.

Other relevant authorities

Ministries, ministerial agencies, and provincial People's Committees are required to collaborate closely with MONRE and MOF to implement activities aimed at fostering the development of the carbon market. In addition, they engage in public awareness

campaigns through mass media to educate the community about the carbon market (The Government, 2022b).

Market participants

Decree No. 06/2022/ND-CP defines three (3) types of participants in the domestic carbon market, including: i) Entities in the list of sectors, GHG emitters subject to conduct GHG inventory promulgated by the Prime Minister; ii) Organizations that participates in the implementation of the domestic and international carbon crediting and offsetting programs/mechanisms; and iii) Other organizations and individuals related to the investment and trading of GHG emission allowances and carbon credits in the carbon market.

The following figure depicts the institutions and participants in the domestic carbon market under the existing regulations.

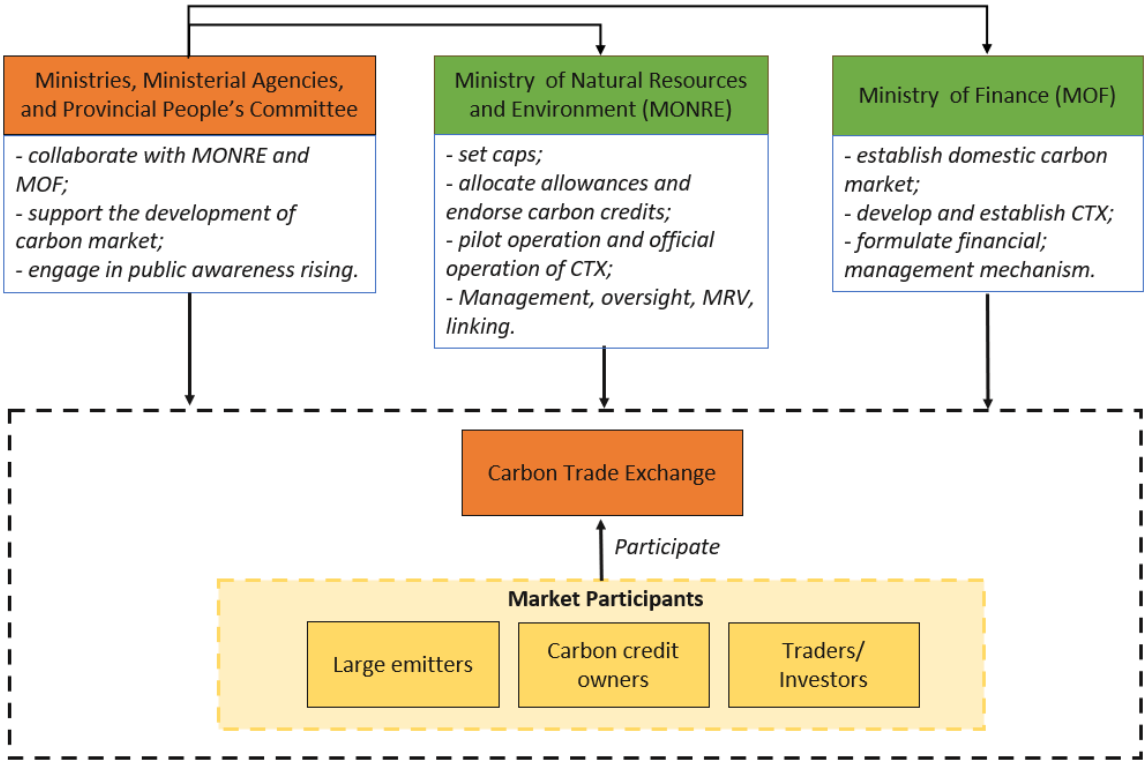

Figure 39: Institutions and participants in the domestic carbon market in Viet Nam

Source: Compiled by the Consultant based on the National Assembly (2020) and the Government (2022a)

III.3.2. Current institutional arrangements for the securities exchange

Over 30 years of development and operation, the securities market in Viet Nam has been well developed with the following institutions and participants:

The Ministry of Finance

According to Decree No. 14/2023/ND-CP dated 20 April 2023 on defining the functions, tasks, powers, and organizational structure of MOF, MOF has the responsibility for the

state management of securities and the securities market. MOF is responsible for formulating policies aimed at advancing the securities market, proposing schemes to establish, dissolve, or transform the ownership, operation mode, or organizational model, of the Stock Exchange, and VSDC. Additionally, MOF holds the authority to grant, reissue, extend, adjust, and revoke licenses, certificates, and related certifications for securities and stock market activities; approve changes, suspend, and cancel activities related to securities and the stock market as stipulated by law. Furthermore, MOF is responsible for managing, supervising, inspecting, and auditing securities and stock market activities; managing securities services and stock market operations in accordance with legal regulations; taking the lead and coordinating with relevant authorities in implementing security measures to ensure the security and safety of the stock market (The Government, 2023).

The State Securities Commission

SCC is under the management of MOF. According to Decision No. 48/2015/QD-TTg issued by the Prime Minister dated 08 October 2015 on functions, tasks, powers, and organizational structure of SSC affiliated to MOF, SSC is responsible for advising and assisting MOF in the state management of securities activities and the securities market; directly manage and supervise securities activities and the securities market; manage service activities pertaining to securities activities and the securities market as stipulated by applicable laws and other duties and powers (The Prime Minister, 2015).

Vietnam Exchange

VNX was officially launched on 11 December 2021, in accordance with Decision No. 37/2020/QD-TTg dated 23 December 2020 of the Prime Minister on the establishment, organization, and operation of VNX. The VNX and its subsidiaries (HNX and HOSE) perform the function of organizing the securities market in Viet Nam and operate under the management and supervision of SSC. The main functions of VNX are to develop five-year strategies, formulate listing and trading regulations, and monitor HNX and HOSE (The Prime Minister, 2020).

Hochiminh Stock Exchange

HOSE, established in 2000 and upgraded to a stock exchange in 2007 (HOSE, 2022b), plays a pivotal role in Viet Nam's financial market. Its main functions are regulated in Decision No. 2399/2017/QD-BTC, dated 21 November 2017 on the issuance of regulations on the organization and operation of HOSE, HOSE is responsible for organizing securities listing, trading, and auctions, strictly adhering to legal regulations. It supervises and ensures compliance with securities laws and stock market regulations by trading members, listed and trading registered organizations, and investors involved in securities transactions. Moreover, it serves as a platform to resolve trading-related disputes through negotiation and mediation, further fostering market integrity. Additionally, HOSE actively contributes to market development by providing essential infrastructure, and technical support, disseminating market information, conducting

training programs, and facilitating knowledge sharing, ultimately bolstering Vietnam's financial landscape (MOF, 2017b).

Hanoi Stock Exchange

HNX, formerly the Hanoi Securities Trading Center, was launched in March 2005 as an internal organization of the SSC. According to Decision No. 2398/2017/QD-BTC issued by MOF, dated 21 November 2017 on the issuance of regulations on the organization and operation of HNX, similar to HOSE, HNX is a government-owned company under the governance of the SSC and operates securities trading platforms for its trading members, admits and administers securities listings, and organizes and monitors the trading members' activities (MOF, 2017a).

Viet Nam Securities Depository and Clearing Corporation

VSDC was established as a wholly state-owned limited liability company to oversee and conduct various securities-related operations in accordance with Decision No. 26/2022/QD-TTg issued by the Prime Minister dated 16 December 2022 on the establishment, organization, and operation of VSDC and Decision No. 1275/2023/QD-BTC issued by MOF, dated 14 June 2023 on regulations on organization and operation of VSDC. VSDC's primary functions include providing registration, depository, clearing, and settlement services for listed securities and public company securities, allocating securities codes and international securities identification numbers (ISINs), processing corporate entitlements, acting as a transfer agent, and offering various asset management services, among other responsibilities. It also manages risk through mechanisms like the Central Counterparty function, Compensation Fund, Clearing Fund, and securities lending and borrowing, ensuring compliance with securities laws. VSDC plays a crucial role in supporting market development by providing essential infrastructure, technical support, information dissemination, training, and knowledge-sharing services (MOF, 2023).

Securities companies

According to Decision No. 27/2007/QD-BTC, issued by MOF, dated 24 April 2007 on promulgating the regulation on the organization and operation of securities companies, a securities company is defined as an organization having the legal entity status and engaged in securities business, covering one, several or all of the following operations: securities brokerage, securities dealing, securities issuance underwriting and securities investment advisory (MOF, 2007b). They are under the management and monitoring of SSC. Some of the prominent securities companies include VNDIRECT Securities Corporation, Saigon Securities Incorporation, MB Securities Joint Stock Company, etc.

Investors

According to Law No. 54/2019/QH14 on Securities, issued by the National Assembly, dated 26 November 2019, investors are organizations and individuals that make investments in the securities market. They play a crucial role in determining market dynamics, as their decisions to buy, sell, or hold securities directly influence prices and

market trends. They conduct transactions through securities companies (National Assembly, 2019).

Currently in Viet Nam, the state regulatory responsibility for the securities market falls under the purview of MOF. Overall, the institutional arrangement related to the securities market is presented in the figure below.

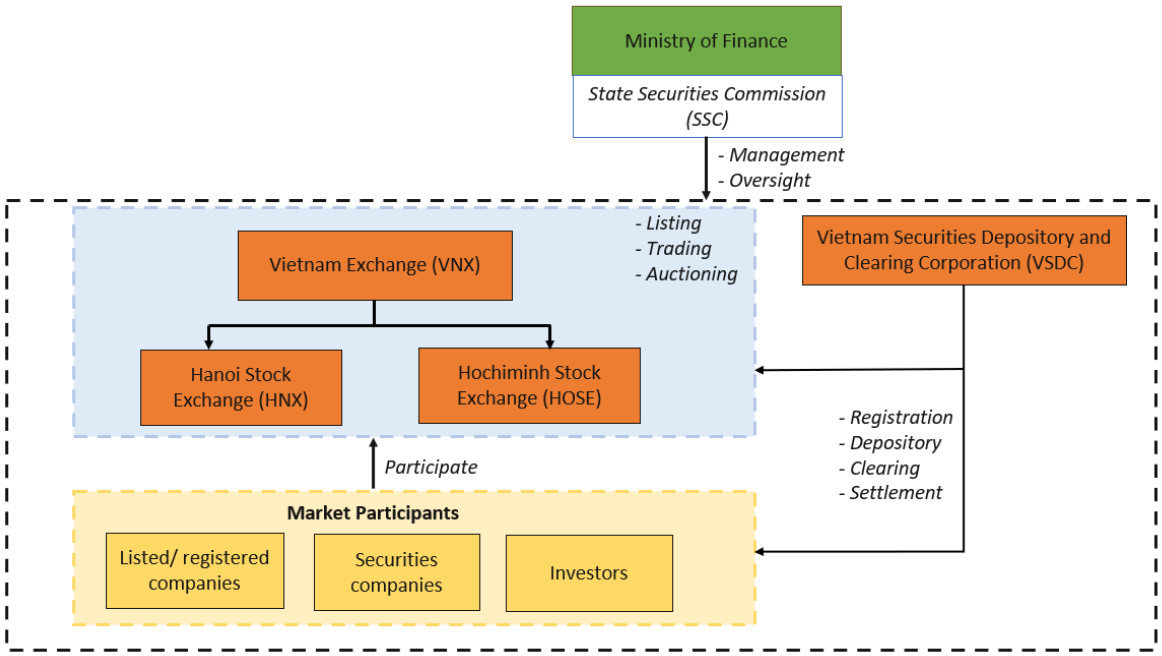

Figure 40: Institutional arrangement in securities market in Viet Nam

Source: Compiled by the Consultant (2023)

III.3.3. Current institutional arrangements for the commodities exchange

The institutions and participants in the commodities exchange in Viet Nam are defined under the Commercial Law and Decree No. 158/2006/ND-CP as follows:

Ministry of Industry and Trade

MOIT takes charge of the commerce and domestic commodities market and performs State management of trading commodities through the commodities exchanges. MOIT is responsible for the following (The Government, 2006), (The Government, 2018):

- Submit the Government for promulgation of regulatory documents governing the trading of commodities through commodities exchanges;
- Decide on the establishment and operation of commodities exchanges, approve operation charter, and approve revisions, and supplements to operation charter of commodities exchange; promulgate list of commodities that are allowed to be traded on the commodities exchanges;
- Organize inspections of activities related to trading commodities on the commodities exchanges;

- Regulate roadmap and conditions for Vietnamese merchants to participate in trading commodities through commodities exchanges abroad;
- Perform other State management, etc.

MOIT is also responsible for the State management of e-commerce (The Government, 2022d).

Commodities exchanges

Although any legal entity that meets the requirements can be a commodity exchange, so far MXV is the only commodities exchange granted with license by the MOIT.

The MXV is responsible for the following tasks (The Government, 2006), (The Government, 2018):

- Select commodities for trading on the commodity exchange;
- Organize, operate, and manage the trading of commodities on the exchange;
- Collect fees for membership, trading, providing information services, and other services;
- Inspect and monitor the trading and declaration of information from the members.

Members of Commodities Exchanges

The members of commodities exchanges include: intermediary merchants (intermediary members) and trading merchants (trading members). Only trading members are allowed to perform trading of commodities on the commodities exchange and only intermediary members are allowed to perform brokerage for trading of commodities on the commodities exchange.

Clearing house

The clearing house has the following responsibilities (The Government, 2006):

- Receive deposits from members and relevant documents related to trading activities;
- Ensure correct payment for trading activities;
- Inform relevant information to accounts of its members in a timely and accurate manner;
- Perform confidentiality obligations.

Commodities delivery center

The commodities delivery center has the following responsibilities (The Government, 2006):

- Not to receive commodities that do not meet the requirements of the commodities exchange;

- Store the commodities to meet the standards, quality, and quantity within the period requested by the commodities exchange;
- Deliver the commodities in accordance with the delivery order of the commodities exchange;
- Report on the storage, preservation, and delivery of commodities in accordance with regulations of the commodities exchange.

E-commerce trading floors

Decree No. 52/2013/ND-CP of the Government on e-commerce defines the responsibilities of enterprises and organizations who provide the service of e-commerce trading floors as follows (The Government, 2013):

- Registering for the establishment of the website to provide the service of an e-commerce trading floor;
- Developing and publishing on the website the operation charter of the e-commerce trading floor;
- Requiring enterprises, organizations, and individuals who are sellers on the e-commerce trading floor to provide the required information;
- Having inspection and oversight mechanisms to provide complete and accurate information about the sellers on the e-commerce trading floor;
- Archiving registration information of enterprises, organizations, and individuals participating on the e-commerce trading floor and regularly updating the information in case of revisions;
- Establishing mechanism to allow enterprises, organizations, and individuals participating on the e-commerce trading floor to perform contracting agreements if the website has an online ordering function;
- Applying necessary measures to ensure information safety related to business confidentiality;
- Having measures for timely handling of violations on the e-commerce trading floor.

The responsibilities of sellers on the e-commerce trading floor are also defined as follows (The Government, 2013):

- Providing complete and accurate information for enterprises, and organizations who provide the service of the e-commerce trading floor;
- Providing complete information on commodities, and services while selling the commodities and providing the services on the e-commerce trading floor;
- Ensuring the accuracy and reliability of information about the commodities and services on the e-commerce trading floor;
- Providing information about business status to the State competent authorities if requested;
- Complying with regulations on payment, advertisement, promotion and protection of intellectual properties and benefits of the consumers.

The following figure depicts the institutions and participants in trading commodities under the existing regulations.

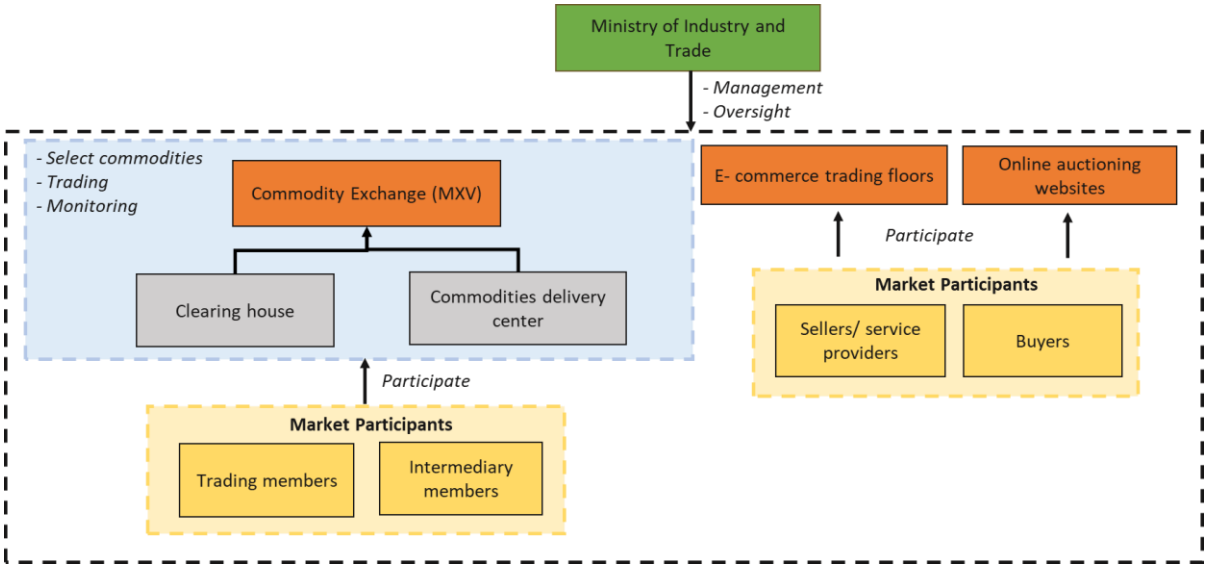

Figure 41: Institutional arrangement for the commodities exchange in Viet Nam

Source: Compiled by the Consultant based on existing regulations (2023)

III.4. Current infrastructure related to the establishment and operation of the CTX

III.4.1. Current infrastructure for the establishment and operation of the carbon market and CTX

There are no specific requirements related to the infrastructure at the national level for the establishment and operation of the carbon market and the CTX in Viet Nam in the current regulations. LEP 2020 only requires the GHG emitters that are obligated to perform GHG inventory to develop and maintain a database system for GHG emissions at the facility level.

However, to facilitate the operation of the carbon market and CTX, Decree No. 06/2022/ND-CP also established a framework for the allocation of allowances and trading principles governing GHG emission allowances and carbon credits in the domestic carbon market.

Regarding allowance allocation, based on the total national allowances, and the GHG inventory results in the latest inventory period and implementation of the GHG emissions mitigation under facilities, MONRE is the focal point agency and identifies the total allowances and the proportion of allowances for reverse and for auction, and promulgates benchmark of GHG emissions per product unit for installations for the period from 2026 to 2030 and every year (The Government, 2022b). The figure below illustrates the basis for the allocation of allowances.

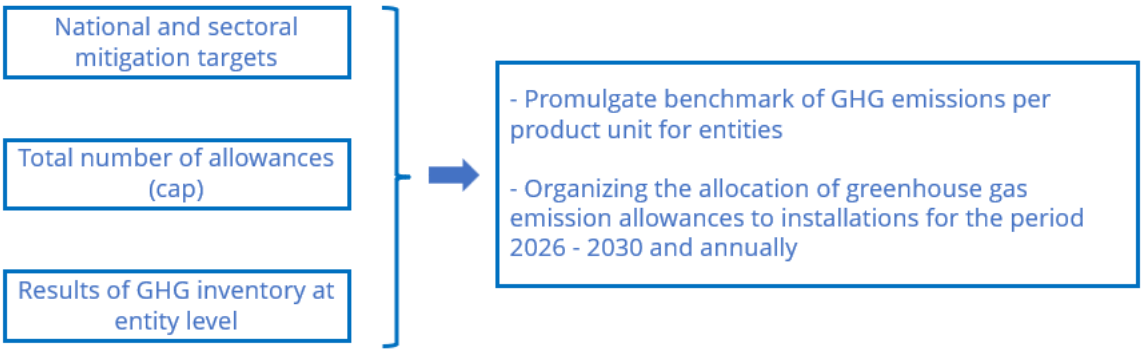

Figure 42: The basis for the allocation of allowances according to Decree No. 06/2022/ND-CP

Source: Compiled by the Consultant based on the Government (2022b)

Regarding the trading principles of GHG emission allowances and carbon credits in the domestic carbon market as per Article 19 of Decree No. 06/2022/ND-CP, the trading of carbon credits and allowances is carried out on CTX and the domestic carbon market according to regulations. Tradable instruments include: (i) GHG emission allowances are traded on the exchange (1 allowance unit equals 1 tCO_2e), and (ii) Carbon credits are allowed to be converted into units to offset allowances on the exchange (1 carbon credit equals 1 tCO_2e). Besides, facilities can participate in auctions and engage in activities such as transferring, borrowing, surrendering GHG emission allowances, and using carbon credits for offsetting. These facilities may bid for additional allowances beyond the allocated ones for the same commitment period, and they have the flexibility to transfer unused GHG emission allowances from one year to the next within the same commitment period. Moreover, facilities can use carbon credits to offset GHG emissions exceeding the allocated allowances during a commitment period, however, the number of carbon credits to offset emissions must not exceed 10% of the total allowances allocated. In case facilities cease operation, dissolve, or declare bankruptcy, the allocated allowances will be automatically recovered by MONRE.

Decree No. 06/2022/ND-CP also defines that the government encourages facilities to voluntarily return unused allowances to contribute to national GHG emission reduction goals. At the end of each commitment period, facilities must settle payments for GHG emissions that exceed the allocated allowances, and these excess emissions will be deducted from allowances allocated for the following commitment period. MONRE provides guidance on auctioning, transferring, borrowing, and surrendering GHG emission allowances.

Having a registry system to register the allowances and carbon credits to be traded in the domestic carbon market, that is linked to the CTX is crucial for the domestic carbon market of Viet Nam. Through this system, the tradable units and ownership of the carbon assets are well recognized in the system to ensure transparency and reliability of the CTX. Moreover, the main design features of the CTX as well as its operation and

management structure should be further detailed in the under-law regulations to ensure strong collaboration among different institutions and effective implementation in reality.

III.4.2. Current infrastructure for the securities exchange

At present, Viet Nam is actively researching and considering the development of the infrastructure for CTX. This necessitates an evaluation of the current infrastructure of the domestic stock market since CTX and the stock market are deeply interconnected. This section focuses on examining the infrastructure of the stock market in Viet Nam to ensure the robustness and security of CTX's infrastructure in the future.

The securities market in Viet Nam commenced operations in 2000 (MOF, 2020d) and has established a robust infrastructure framework. Viet Nam has three stock exchanges: HOSE was established in 2000 (HOSE, 2022a), HNX was established in 2005 (HNX, n.d.-a), and the Unlisted Public Company Market (UPCOM) started trading in 2009 (HNX, n.d.-a).

III.4.2.1. Infrastructure for different transaction methods

Three transaction methods exist: manual trading, semi-electronic transaction, and electronic transaction, with the latter emerging as the dominant trend. HOSE pioneered online trading in 2007 to address limitations of traditional systems. This move facilitated market liberalization, attracting global investors and foreign capital. Circular No. 134/2017/TT-BTC defines electronic transactions as securities transactions conducted through IT systems and networks, encompassing trades between investors and online service providers, transaction members and exchanges, as well as related transactions among depository participants, clearing members, and VSDC.

Circular No. 134/2017/TT-BTC outlines requirements for the technical infrastructure of online securities transaction systems. These include: a dedicated server physically separated from other systems for cybersecurity and minimizing risks; a secure environment with access controls, surveillance, and backup power; specific data center standards; integration of digital certificates for secure transactions; call recording and management tools for phone-based services; and clear procedures for setting limits on online investor transactions (MOF, 2007a).

III.4.2.2. Infrastructure for different types of securities market

According to the circulation of capital sources, there are two types of securities markets, the primary market, and the secondary market. Accordingly, the primary market refers to the market where securities are created, while the secondary market is one in which they are traded among investors.

The secondary market can be organized in two forms: the centralized market and the decentralized market. A centralized securities market is a market where the trading of listed securities is tightly organized. Typically, only large, reputable businesses that

meet listing standards are allowed to list on this market. Trading is primarily executed through centralized order matching. The decentralized securities market, or OTC market, operates through a system based on competitive bidding and negotiation facilitated by information media (Academy of Finance, 2008). In the OTC market, transactions are conducted through a network of securities companies scattered all over the country and interconnected by electronic means. Prices in this market are formed by agreement. The table below provides the differences between the centralized market and OTC.

Table 12: The differences between the centralized market and OTC

Centralized Market	OTC
Has a specific trading center	No specific trading center
Centralized auction mechanism	Negotiated price agreement
Single price for security at a given time	Multiple price levels for a security at a given time
Securities are listed	Securities may or may not be listed
Direct management organization is the exchange	The direct management organization can be the exchange (for stocks with ISIN codes) or the issuing company (for stocks without ISIN codes)
Clear settlement mechanism	Flexible and diverse settlement mechanisms
High liquidity	Low liquidity

Source: Academy of Finance (2008)

In general, the decentralized market allows for more flexibility in trading. Transaction processing is also faster as it does not require an exchange but only involves confirmation from the parties involved. However, this increased flexibility also leads to higher associated risks compared to trading on a centralized market.

Securities trading on the centralized securities market is conducted in Viet Nam through HOSE, HNX, and UPCOM exchanges, using the centralized order matching method. According to Circular No.120/2020/TT-BTC, issued by MOF, dated 31 December 2020 on providing for trading of listed and registered shares, fund certificates, corporate bonds and secured warrants listed on securities trading systems, centralized order matching method means a trading method whereby the securities trading system matches securities buy and sell orders according to price priority and time priority, in which, price priority related to buy orders at higher prices are executed first and sell orders at lower prices are executed first. Time priority regarding if multiple buy or sell orders are received at the same price, an order entered into the system with an earlier time trades first (MOF, 2020a).

In general, there are two types of accounts in the securities exchange: the trading account and the depository account. However, the functions of these accounts for each

market participant are different. A description of each account and its functions is outlined in Annex 9 of this Report.

The following figure provides an overview of the transaction process in the centralized securities market in Viet Nam while further details as provided in Annex 8 of this Report.

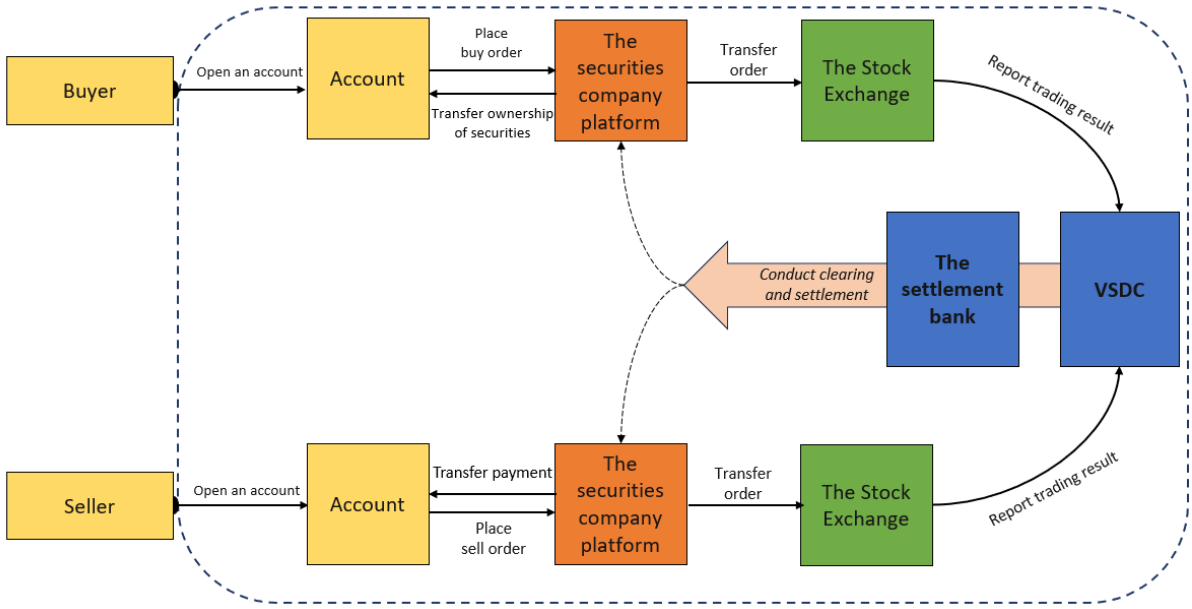

Figure 43: The transaction process in the centralized securities market in Viet Nam

Source: Compiled by the Consultant based on the Academy of Finance (2008)

III.4.3. Current infrastructure for the commodities exchange

In general, the operation of the commodities exchange is similar to the securities exchanges like HOSE, and HNX. The difference is that MXV is the only exchange for commodities in Viet Nam and it can be linked directly to other international commodities exchanges in the world. The comparison between commodities transactions and securities transactions on the exchanges in Viet Nam is provided in the table below.

Table 13: Comparison of commodities exchange and securities exchange in Viet Nam

Categories	The commodities exchange	The securities exchange
The number of accounts	Approximately 20,000 accounts	Approximately 7,000,000 accounts
Market Connectivity	The international interconnected market	The domestic market
Trading Intensity	Unlimited trading intensity due to T+0 trading to profit or cut losses within the same day	Limited trading intensity due to regulations related to the T+3 settlement period*

* The T+0 trading is expected once HOSE's KRX system is fully operated

Source: Compiled by the Consultant based on HOSE (2023), MXV (2022)

To trade on the commodity exchange, customers must open a trading account with a trading member of MXV. Customers are allowed to open multiple trading accounts in principle, with each trading member limited to opening only one trading account. In addition, trading members may open trading accounts for proprietary trading, or brokerage members have the right to open commodity trading accounts for customers after signing a business cooperation agreement with a trading member (MXV, 2020). Trading accounts are used for the following purposes:

- Placing trading orders;
- Receiving and returning margin for customers;
- Receiving profits or settling actual losses from customer position closures;
- Confirming the transfer of underlying commodities for customer-held positions. In the case of holding a buying position, the transfer of money and receipt of commodities will be carried out, whereas for holding a selling position, the delivery of commodities and receipt of money will be performed.

In general, the transaction process in the commodities market parallels that of the stock exchange. Buyers and sellers place orders with trading members of MXV. Trading orders are then reported to MXV and subsequently settled and cleared by the clearing house. Overall, the transaction process in the commodities market in Viet Nam is illustrated in the figure below.

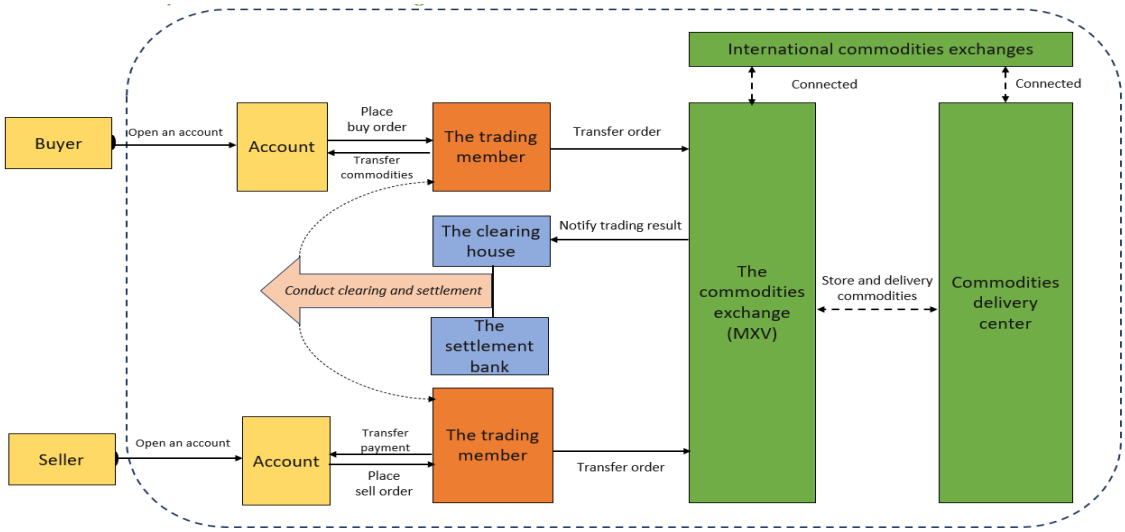

Figure 44: The transaction process in the commodities market in Viet Nam

Source: Compiled by the Consultant based on VMEX (n.d.)

IV. TASK 5: ANALYSIS OF LEGAL, INSTITUTIONAL AND INFRASTRUCTURE GAPS FOR ESTABLISHMENT AND OPERATION OF CTX IN VIET NAM AND RECOMMENDED SOLUTIONS BASED ON INTERNATIONAL EXPERIENCE AND THE COUNTRY'S CONTEXT

IV.1. Analysis of legal, institutional and infrastructure gaps for establishment and operation of CTX in Viet Nam

The overview of international experiences shows that the CTX is only one component of the carbon market. To establish a carbon market and make the CTX operational, it is necessary to consider other components as follows:

- **National authorities**: to administrator the Registry to be linked to the CTX, to set rules, and to perform market management and oversight;
- **Traded commodities on the market**: allowances and carbon credits should be clearly defined and readily available at the time of operation of the CTX;
- **Market participants**: buyers from the demand side, and suppliers from the supply side, as well as other participants like investors, intermediary entities, market makers, etc.

Once the above components are in place, the CTX will play its role as a centralized trading platform to facilitate transactions and enhance the transparency and reliability of the market.

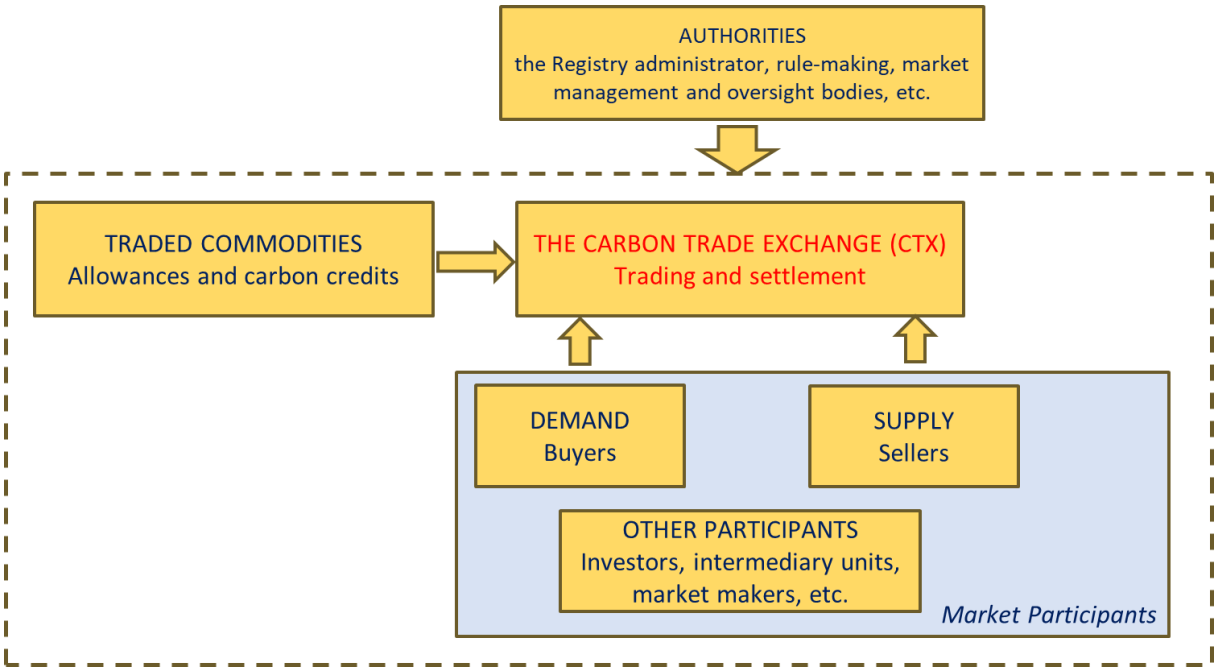

Figure 45: Key components of the carbon market

Source: Compiled by the Consultant (2023)

The review and the analysis of international experiences and national conditions under Task 4 identified the different gaps for the establishment and operation of the CTX in Viet Nam, as illustrated in the following section.

IV.1.1. Legal gaps

The assessment of the national context in Viet Nam reveals that while the legal framework for the carbon market and the CTX exists, it lacks the comprehensiveness necessary to facilitate the effective establishment and operation of these mechanisms.

Existing regulations provided relevant definitions of allowances and carbon credits, some design elements, and key principles for the MRV system and the CTX. The roadmap for the development of the carbon market was also defined under Decree No. 06/2022/ND-CP.

However, the existing gaps pose challenges for the existing regulations to address the complexity and requirements for the effective operation of the carbon market. The legal gaps identified from the review of the national context from different angles are detailed as follows.

Regarding the traded commodities

According to Decree No. 06/2022/ND-CP, MONRE will submit to the Prime Minister to approve the total cap and the ratio retained for reserve and auctioning for the 2026-2030 period and annually. Based on the cap and GHG inventory and mitigation reports at the facility level, MONRE will collaborate with line ministries to develop benchmarks for products and organize for allocation of allowances to the covered facilities.

There is a lack of data to establish the emission cap and develop a benchmark for the allocation of allowances. Based on regulations under LEP 2020 and Decree No. 06/2022/ND-CP, the first GHG inventory reports at the facility level will be submitted to MONRE only by the end of March 2025. For an effective design of the ETS, it is required to collect GHG emissions data from facilities for at least three years to establish a reliable baseline. Using benchmarking as a method for the allocation of allowances would require robust data from different industrial sectors and a long time to negotiate with the stakeholders in the industries to agree on the benchmark and the allocation method.

There are no specific regulations on the criteria for evaluating and determining the eligibility of the carbon credits to be traded on the market.

The classification of allowances and carbon credits, whether as financial products or standard traded commodities, remains undefined within the existing regulations. This ambiguity complicates the selection of appropriate legal frameworks for conducting transactions involving allowances and carbon credits.

Additionally, carbon ownership is not clearly regulated. According to Decision No. 130/2007/QD-TTg of the Prime Minister on some mechanisms, and financial policies for

CDM projects, the carbon credits from the projects would belong to the project owners and they are free to sell the carbon credits from their projects on the carbon market. However, there are no clear regulations on carbon ownership for state-owned projects or projects that are implemented from the state budget or loans. The ownership of allowances which are assets purely created by the Government is not regulated.

Regarding the compliance requirements

For the operation of the ETS, it is crucial to develop the requirements and guidance for the MRV system to ensure that the cap is met, and enterprises take appropriate actions to ensure that their GHG emissions do not exceed the allowances allocated by the authority. Under Decree No. 06/2022/ND-CP, line ministries are responsible for guiding enterprises within their managed sector to report on GHG inventory and measure GHG emission reductions. Currently, MONRE, MOIT, and the Ministry of Agriculture and Rural Development have promulgated the Circulars to guide the MRV system in the waste management sector, the industry and trade sector, and the forestry and agriculture land, respectively.

It is necessary that ministries in charge of the remaining sectors covered in the ETS (Ministry of Transport, Ministry of Construction) also develop similar guidance to track the GHG emissions at the facility level to ensure their compliance with the regulated emission target.

Decree No. 06/2022/ND-CP established requirements for verification entities. However, the registration process and the list of verification entities have not yet been published on the website of the national authority on climate change.

Although the covered facility is mandated to compensate for GHG emissions surpassing the allocated allowances and have the excess deducted from the subsequent allocation, the specific fee level remains undefined. Furthermore, it is unclear whether this violation constitutes an administrative default, as it falls outside the scope of Decree No. 45/2022/ND-CP governing administrative violations in the environmental protection sector.

Regarding the national registry system

The functions of a registry system have been clearly regulated under LEP 2020 and Decree 06/2022/ND-CP, including: (i) Allocating allowances to covered entities; (ii) registering carbon projects/programs for trading carbon credits; (iii) Certifying the types of carbon credits eligible to participate in the carbon market; (iv) Transferring unused GHG emission allowances in the previous year to the following years within the same compliance period; (v) Borrowing the allowances allocated for the next year to be used in the previous year within the same compliance period; and (vi) Using carbon credits from projects under carbon credit exchange and offset mechanisms to offset GHG emissions exceeding the allocated allowances within a compliance period, etc.

Nonetheless, there are no specific provisions in the existing regulations that mention the establishment and operation of the registry system for the domestic carbon market as well as its main design features. This is a key component that enables the operation of the ETS and the CTX and thus is necessary to be regulated under the legal framework for the domestic carbon market in Viet Nam.

Regarding the designation and operation charter for the CTX

LEP 2020 and Decree No. 06/2022/ND-CP regulate that the operation charter for the CTX shall be developed before 2027. While MOF is assigned to take the lead in the establishment of the CTX, MONRE is assigned to take the lead in the pilot operation and official operation of the CTX.

Based on the design of the ETS, the functions of the CTX, and the market structure for the operation of the carbon market, the designation and operation charter of the CTX will be different. It is thus important that in the next stage of the CTX development MOF and MONRE will work together to decide on the selected option for the establishment of the CTX and the suitable structure for the operation of the carbon market. This collaboration will be the basis for further development of the legal framework for the CTX in Viet Nam.

Regarding the financial mechanism

To operate the CTX, it is necessary to develop a financial mechanism for transactions of allowances and carbon credits. In the K-ETS for example, the transaction fee is 0.1% of the total trade amount (transaction fee: 0.08%, clearing settlement fee: 0.02%). In the UK-ETS and New Zealand ETS, there are also fees on application for allowances and carbon credits, annual subsistence, variation, transfer, revocation, surrender, etc.

Decree No. 06/2022/ND-CP regulates that MOF will take the leading role in the promulgation of a financial management mechanism for the operation of the carbon market. This should be made available before the operation of the CTX.

Regarding market management and oversight

There are no clear provisions on market management and oversight in the existing regulations under LEP 2020 and Decree No. 06/2022/ND-CP. The regulations on the appropriate measures should be in place before the operation of the CTX to monitor the market operation and deal with distortion, price fluctuation, market violations, etc. to ensure stable and reliable operation of the carbon market.

Experiences from international case studies show the use of different measures that may offer good lessons for Viet Nam, for example: cost containment, market flexibility mechanisms, etc.

IV.1.2. Institutional gaps

As mentioned above, Decree No. 06/2022/ND-CP identifies three groups of participants in the domestic carbon market including "Other organizations and individuals involved in investment, trading activities of allowances and carbon credits in the carbon market".

However, the criteria for the assessment and approval of "other organizations and individuals" to be eligible for investment and participation in the domestic carbon market are lacking and should be clearly defined under future regulations to increase transparency and ensure the fair participation of relevant stakeholders.

Besides, for the national authorities to govern the CTX, while MOF is assigned to take the lead in the establishment of the CTX, MONRE is assigned to take the lead in the pilot operation and official operation of the CTX. Based on the selected option for the establishment of the CTX and the suitable structure for the operation of the carbon market, the roles and responsibilities of authorities and participants involved in the carbon market and their coordinating mechanisms will differ accordingly which should be reflected in the future regulations as well.

As earlier mentioned, existing regulations for the domestic carbon market under LEP 2020 and Decree No. 06/2022/ND-CP do not specifically regulate the development and operation of the registry system. However, a discussion with the Department of Climate Change, MONRE revealed that a national registry system is expected to be developed under the Partnership for Market Implementation (PMI) project and scheduled to be in place by September 2024. In this case, there will be a need to assign a national registry administrator to manage the operation of the registry and ensure the linkage with the CTX.

IV.1.3. Infrastructure gaps

Currently, the national registry system is not yet operational, with expectations set for its launch by September 2024, as previously indicated. Conversely, there is currently no comprehensive infrastructure supporting the implementation of the ETS. This includes the absence of a national database for GHG inventory data from covered facilities to effectively manage and monitor emission caps, as well as the lack of tools for the allocation of allowances. Additionally, both the CTX and the allowance auction platform have yet to be developed. The specific infrastructure requirements for these platforms will vary depending on the chosen option for establishing the CTX and the optimal structure for the carbon market's operation. Furthermore, there is currently no centralized system for MRV of GHG emissions and reductions.

However, the existing infrastructure of the stock exchange and the commodities exchange is similar to those of the CTX. International experiences show that the CTX can leverage the existing infrastructure for trading allowances and carbon credits in the carbon market.

IV.2. Different options for the establishment and operation of the CTX in Viet Nam

The review of the national context and the gap analysis show that overall, the development of the CTX in Viet Nam can be based on the utilization of the existing exchanges or the development of a brand-new one.

As indicated above, the existing exchanges for securities or commodities can be utilized for the CTX. International case studies show that for a CTX to operate effectively, it must encompass not only trading services but also clearing and payment functions. Consequently, a basic e-commerce trading platform falls short of meeting these system requirements. The most viable solution lies in leveraging existing securities exchanges such as VNX (HOSE or HNX) or commodities exchanges like MXV.

Under Decree No. 06/2022/ND-CP, only MOF and MONRE are assigned for the development, pilot operation, and official operation of the CTX. Therefore, the commodities exchange under the management of MOIT would not fit in the overall existing legal and institutional framework for the domestic carbon market and CTX in Viet Nam. Moreover, the securities exchange has been in operation for a much longer period than the commodities exchange (HOSE and HNX were established in 1998 while MXV was established in 2018). The securities market is also much more mature and active with about 7,000,000 domestic trading accounts and nearly 45,000 foreign trading accounts (HOSE, 2023) while there are only about 22,000 accounts in the commodities market operated by MXV (MXV, 2022).

For the latter option to develop a brand-new separate exchange for carbon trading, it would be more convenient for MONRE, as a national authority in charge of the generation of allowances and carbon credits, of MRV and pilot operation and official operation of the CTX to develop a new exchange based on their own requirements.

Therefore, the two options for establishment of the CTX in Viet Nam are as follows:

Option 1: Establish the CTX based on the infrastructure system of the securities exchange

The advantages of this option are:

- Leverage of the existing system and infrastructure under the existing securities market in Viet Nam
  The country has applied modern technologies over the past years for the development of the securities market and management of the stock exchange. The system of servers and archiving system has met safety and information confidentiality requirements for online transactions of securities. An extended network has been formed to connect the local network of the securities exchanges with MOF, SSC, and VSDC.
- No requirement to organize a new unit/organization.

Under this option, it is only required that the Minister of MOF reports to the Prime Minister to assign a new task for the VNX. According to Item 2, Article 43 and Item 4, Article 46 of the Law on Securities in 2019, it is regulated that "the Prime Minister decides on the establishment, dissolution, operation structure, mode of ownership, functions, rights and responsibilities of VNX and the establishment of sub-units under the VNX at the request of the Minister of Finance" and "the Prime Minister decides on organization, assignment for implementation of rights, responsibilities of VNX and its sub-units in accordance to regulations of this Law based on the request of the Minister of Finance".

- Utilization of experiences in the organization and operation of the securities market of VNX; in management and oversight of transactions and utilization of a part of the information disclosure system.

This option however entails the following disadvantages:

- Not in line with the responsibilities of ministries for the development of the domestic carbon market under Decree No. 06/2022/ND-CP in which MONRE is responsible for presiding and cooperating with relevant ministries for the organization of pilot operation and official operation of the CTX;
- Allowances and carbon credits are not the same categorization as securities. For allowances and carbon credits to be listed and registered for transactions on a separate panel in the securities trading system, it is necessary to review and revise the regulations in the Law on Securities regarding the definition of securities, and to supplement regulations on responsibilities for management and operation of CTX and to invest in upgrading and adjusting the existing infrastructure system;
- There may be difficulties for a securities management authority to organize and operate the CTX on which MONRE plays the leading role in the formation of the transacted commodities and in governing the market demand and supply. For the first step, it is necessary to have a mechanism and technology infrastructure to ensure the connection and information sharing in a timely, continuous, transparent, and flexible manner between VNX, VSDC, and the agency responsible for certifying allowances and carbon credits at MONRE.

Option 2: Develop the CTX model independent from the stock exchange system, managed by MONRE.

The advantages of this option are:

- In line with provisions at Item 2, Article 21 Decree No. 06/2022/ND-CP in which MONRE will be responsible for presiding and collaborating with relevant ministries for the organization of pilot operation and official operation of the CTX for management and oversight of the carbon market;

- Ensure a unified market management authority from formation of the transacted units to establishment, regulations of demand and supply on the market, and management and oversight of transactions on the market;
- It will be more convenient for connecting and sharing information about management of market transactions among organizations, and agencies under MONRE than among organizations, and agencies under different ministries.

On the other hand, this option also entails disadvantages as follows:

- According to LEP 2020 and Decree No. 06/2022/ND-CP, MOF is assigned for the establishment of the carbon market and the CTX. However, based on its functions and responsibilities, it will be impossible for MOF to propose the establishment of a unit/organization under MONRE for the operation, monitoring, and management of the CTX. The establishment of a new unit/organization shall require a review of the functions and responsibilities of Ministries, and agencies, revisions of relevant legal documents, and the development of a Proposal for the establishment of a unit/organization for management, oversight, and operation of the CTX;
- It seems not feasible to propose the establishment of a new unit or organization under MONRE immediately following the promulgation of Decree No. 68/2022/ND-CP which just took effect from 01 November 2022, which regulates MONRE's functions, tasks, authorities, and organizational structure;
- According to Decree No. 06/2022/ND-CP, the CTX shall be established and come into pilot operation from 2025. The development of the CTX is thus very urgent. Currently, MONRE does not have any plan for either assignment of any of its sub-agencies to perform management, oversight, and operation of the CTX or to develop a transaction platform for the CTX. Therefore, it would be difficult to ensure the timeline for pilot operation from 2025 if the CTX is developed in the direction of having a unit/organization under MONRE to manage and operate the CTX.

The following table summarizes the two options for the establishment of the CTX in Viet Nam and their advantages and disadvantages.

Table 14: The comparison of suitable options for the establishment of CTX in Viet Nam

Option	Option 1	Option 2
Description	Establish a CTX based on the infrastructure system of the stock exchange	Develop a carbon trade exchange model independent from the stock exchange system, managed by the MONRE
Advantages	Leverage the existing infrastructure framework of the Vietnamese securities market leads to: • No need to establish a new unit/organization; • Leverage experience in organizing and operating the trading market of the Stock Exchanges. This includes refining management methods, enhancing transaction oversight, and optimizing the information disclosure system.	• In accordance with the provisions of Clause 2, Article 21 of Decree No. 06/2022/ND-CP; • Ensure unified management of the market; • Connecting and sharing information in the process of managing market transactions between agencies under the MONRE will be more convenient than between agencies under different ministries.
Disadvantages	• Not aligned with regulations on the responsibilities of ministries in developing the domestic carbon market regulated in Decree No. 06/2022/ND-CP; • Allowances and carbon credits are not types of securities; • The securities management agency organizes and operates CTX (a commodity established by MONRE, and MONRE determines supply and demand) will create certain difficulties and problems.	• MOF cannot propose the establishment of a unit/organization under MONRE to operate, supervise, and manage CTX; • Proposing the establishment of a new unit/organization under MONRE (immediately after the issuance and enforcement of Decree No. 68/2022/ND-CP regulating the functions, tasks, powers, and organizational structure of the MONRE) is not feasible; • It would be challenging to ensure the implementation schedule for the pilot operation from 2025.

Source: Compiled by the Consultant (2023)

Along with the above options for the establishment of the CTX, there are also different options for designing the market structure for trading allowances and carbon credits.

Based on international experiences, for the primary market, there are two options for the operation of the CTX as follows:

Option 1: Free allocation of allowances for all covered entities (and certification of carbon credits eligible for transactions on the secondary market).

While this option has the advantage of reducing the financial burden for the enterprises participating in the carbon market, it does not incentivize enterprises to take action for GHG emission reductions because they do not need to pay for the allocated allowances. Moreover, under this option, enterprises may choose to participate in the primary market only, making the secondary market less active.

Option 2: Free allocation of allowances combined with auctioning (and certification of carbon credits eligible for transactions on the secondary market).

This option makes the secondary market more active because enterprises have to pay for the auctioned allowances. This will improve the liquidity and ensure the effective operation of the market. It also incentivizes enterprises to take on GHG emission reduction efforts. The disadvantage of this option is that enterprises have to bear the financial burden of participating in the auctions of allowances and it requires the legal regulations, institutions, and infrastructure for organizing and governing the auction in place.

The table below discusses the two options for operating the primary market in Viet Nam and their advantages and disadvantages.

Table 15: Comparison of suitable options for the structure of the primary carbon market in Viet Nam

Option	Option 1	Option 2
Description	Allocation of free allowances to all market participants (MONRE, along with relevant key ministries, is responsible for allocating free allowances)	Combination of free allocation and auctioning of allowances on the exchange (MONRE, along with relevant key ministries, is responsible for allocating free allowances. MONRE is responsible for deciding the volume of allowances for auctioning)
	Certification of carbon credits eligible for participating in the secondary market	
Advantages	Reduce the financial burden for entities when participating in the carbon market because, in the primary market, entities are allocated free allowances.	Create excitement in the primary market when entities participating in the market have to allocate money to participate in the allowances auction. This leads to: • Increase liquidity, and ensure the market operates effectively; • Increase the motivation of businesses in efforts to reduce GHG emissions.
Disadvantages	• Fail to create incentives for entities in the mission of reducing GHG emissions because entities do not have to allocate money to receive allowances in the primary market; • Many entities only choose to participate in the primary market, making the secondary market less vibrant.	• Entities participating in the market will need to pay a price for the allowances and to pay fees for participating in the allowances auctions.

Source: Compiled by the Consultant (2023)

International case studies also indicate two options for the operation of the secondary market for the CTX under centralized and decentralized models as follows:

Option 1: Trading both allowances and carbon credits on a centralized system with separate panels for allowances and carbon credits.

The advantage of trading on the exchange is that it is highly regulated and market information, such as prices and trading volume, is made available to members of the exchange, the government, and the public. Transactions through a clearing house would guarantee the financial obligations between the buyer and the seller and avoid violations of the parties.

The disadvantage is that it somehow limits the flexibility of the system to allow linkage to the international carbon market, especially for carbon credits of which only 10% are eligible to offset for allowances in Viet Nam.

Option 2: Trading only allowances on a centralized system. Carbon credits can be purchased from the domestic or international voluntary carbon market.

This option addresses the disadvantage of the above option, in which carbon credits can freely participate in international voluntary carbon markets. However, the transactions of carbon credits based on OTC trading might entail higher risk and less transparency in terms of traded price and volume than exchange-based options.

The table below discusses the two options for operating the secondary market in Viet Nam and their advantages and disadvantages.

Table 16: Comparison of suitable options for the structure of the secondary carbon market in Viet Nam

Option	Option 1	Option 2
Description	Trading allowances on a centralized exchange	
	Trading of carbon credits on a centralized exchange (together with allowances)	Trading of carbon credits voluntarily in the domestic or international carbon market (separated from the centralized exchange for allowances)
Advantages	• Reduce transaction risk; • Provide transparent information about trading prices and volume	More flexible for linking with domestic and international voluntary carbon market.
Disadvantages	Limit flexibility of the system, especially related to linking with international carbon market	• Higher risk due to unstandardized transaction agreements; • Less transparency in terms of price and volume as well as other market information

Source: Compiled by the Consultant (2023)

In any case, the functions of the registry system should be covered for the following purposes:

- Allocating of allowances to covered entities;
- Certifying the types of carbon credits eligible to participate in the carbon market;
- Connecting with the MRV system of emissions of the covered- entities to ensure obligations are met;
- Transferring unused GHG emission allowances in the previous year to the following years within the same compliance period;
- Borrowing the allowances allocated for the next year to be used in the previous year within the same compliance period;
- Using carbon credits from projects under carbon credit exchange and offset mechanisms to offset GHG emissions exceeding the allocated allowances within a compliance period;
- Connecting with the management and oversight system to perform penalties in case of violations.

Based on the gap analysis and identification of different options to address the gaps, the Consultant held consultation meetings with relevant institutions (MOF, MONRE, VCSD, SSC, HNX, and HOSE) from 27-29 November 2023 and a wide stakeholder consultation workshop was organized on 30 November 2023 to consult the stakeholders about the recommended option for establishment of the CTX in Viet Nam. The details of the stakeholder consultation were reported in Task 6 of the Assignment and the recommendations were summarized in the below section.

IV.3. Recommendations for the establishment of the CTX in Viet Nam

The review of international case studies suggests that leveraging existing infrastructure, manpower, and resources of the securities market is a cost-effective and efficient approach to establishing the carbon market. Stakeholder consultation indicates significant challenges for MONRE in creating a new unit or organization to oversee the CTX within the 1–2-year pilot timeframe. Additionally, MONRE faces a substantial workload, including developing and operating the registry, setting caps, allocating allowances, certifying carbon credits, and establishing the necessary database and MRV system. Proposing revisions to Decree 68/2022/ND-CP on MONRE's functions and structure shortly after its implementation is also challenging. Therefore, the recommended option for the establishment of the CTX in Viet Nam is to harness the existing system of the stock exchange.

Recommended legal solutions

It should be noted that the current legal framework for the securities market does not cover the trading of allowances and carbon credits on the carbon market. No provisions within the Law on Securities in 2019 and Decree No. 155/2020/ND-CP of the Government guiding the implementation of the Law on Securities as well as relevant guiding Circulars and Decisions establishing SSC, VNX mention the carbon market.

Therefore, to accommodate the timeline for the establishment and pilot operation of the CTX from 2025, the revision of the Law is not recommended because revision procedures would not be able to be completed within more than a year. The recommended legal solution is that:

- MONRE will perform unified management of the carbon market, including establishing the registry system for allowances and carbon credits; setting regulations for the MRV system and requirements for allowances, carbon credits, and market participants; deciding on the scope of utilizing the stock exchange system when the market participants engage in trading allowances and carbon credits in the secondary market;
- CTX will be established based on utilizing the services from the stock exchange system managed by MOF (with the participation of SSC, VNX, VSDC, etc.).

The proposed legal documents to be developed in the near future to realize this option include the following:

- Decree issued by the Government on establishing and operating the pilot CTX;
- Decision issued by the Prime Minister assigning MONRE to develop and manage the carbon market;
- Decision issued by the Prime Minister to assign the operation of the pilot CTX to VNX, VSDC, and MONRE;
- Decision issued by MOF on adjusting the operating regulations of VNX and VSDC related to the pilot CTX;
- Other guiding documents for procedures to operate the CTX.

Recommended institutional solutions

As mentioned above, MONRE will use the services of the stock exchange system under MOF to operate the CTX. Therefore, the specific roles and functions of VNX and VSDC in the carbon market will depend on the scope that MONRE would need to utilize the service of the stock exchange system for carbon trading.

Based on the review of the current country's context and discussion with relevant stakeholders, the recommended institutional arrangements are as follows:

- **MONRE:** playing the leading role in the development and management of the carbon market, including the development and operation of the national registry system and the operation of the CTX;
- **MOF:** collaborating with MONRE for the design, development, and operation of the CTX, playing the leading role in the financial management of the carbon market, providing directions for SSC, VNX, and VSDC to fulfill the requirements for carbon transactions;
- **VSDC:** collaborating with the National Registry System for application/account management, performing depository, clearing and settlement for carbon transactions;

- **VNX**: assigning the suitable stock exchange (HNX or HOSE) to provide a trading platform for the execution of carbon transactions.

The following figure describes the general recommended institutional arrangements based on this option:

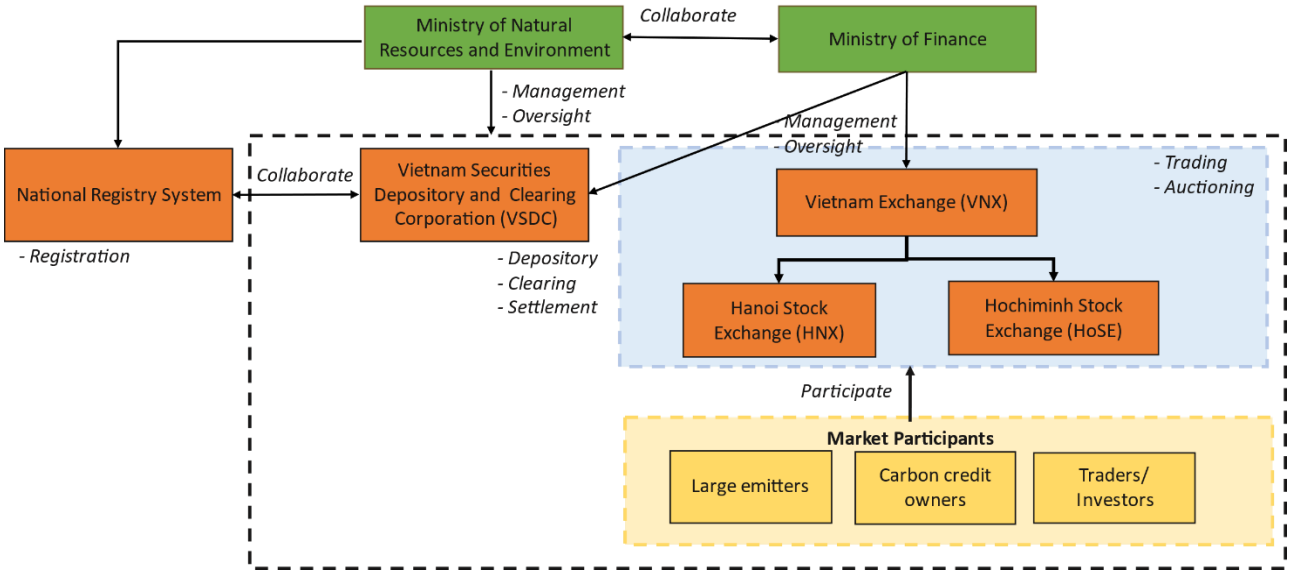

Figure 46: Recommended institutional arrangements for the CTX

Source: Compiled by the Consultant (2023)

Recommended infrastructure solutions

Based on the international experiences for the operation of the CTX, the flow of allowances and credits in the carbon market and relevant transactions are as follows:

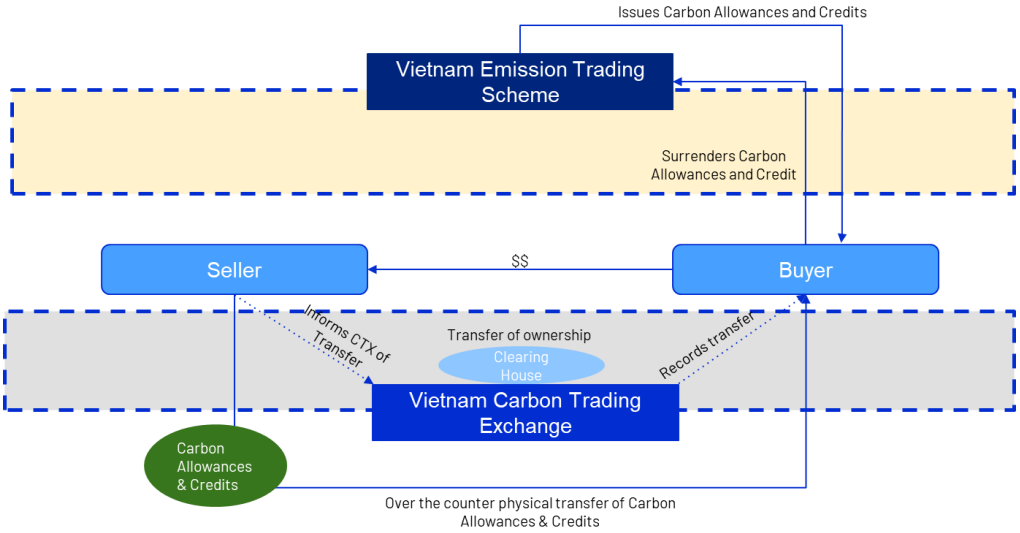

Figure 47: The CTX trade flow

Source: Compiled by the Consultant (2023)

One of the considerations for the Viet Nam CTX is whether it intends to provide future linkage and interoperability functions with other countries. International experience shows that working with the likes of the Climate Action Data Trust registry would be something to consider if the intention is to have future linkages with other national CTX.

In terms of national capacity, discussions with VSDC, HNX, and HOSE show that further investment is needed for the existing infrastructure of the stock exchange to accommodate carbon transactions. The scale of investment will depend on the scope of service that MONRE will utilize for the operation of the CTX. However, this is considered a manageable task. In fact, HNX already had a similar experience when they launched a dedicated trading platform for privately placed corporate bonds in July 2023 while HOSE also shared that under the KRX project, they already learned the experience from Korea to operate the carbon exchange.

IV.4. Recommendations for the operation of the CTX

As mentioned earlier, the CTX only provides a centralized trading platform for participants in the domestic carbon market of Viet Nam to perform selling and purchasing of allowances and carbon credits in a more transparent and reliable manner than the traditional over-the-counter method. Therefore, the CTX cannot be established and existed in vacuum. For the operation of the CTX, it is necessary to develop a full-fledged system for trading of allowances and carbon credits in the carbon market, including the legal framework (rules, mechanisms), institutional framework (identification of roles and responsibilities of relevant actors), and infrastructure (different systems that are connected to and support carbon transactions).

International experience shows that the operation of the carbon market does not follow a fixed model but needs frequent adjustments based on the performance of the market and the overall socio-economic circumstance of the country in each period of time.

Therefore, the following table presents the recommended solutions to fill the gaps and the suggested timeframe for implementation of such solutions based on the schedule for the pilot operation of the CTX from 2025 as per Decree No. 06/2022/ND-CP. Further recommendations for the official operation of the CTX would depend on the results of the pilot operation once available.

Table 17: Recommended solutions to fill the gaps for pilot operation of the CTX and suggested timeframe

No.	Recommended solutions	Time frame	Governmental authorities in charge	Notes
I	**Legal framework**			
I.1	Develop legal document(s) to define the scope, establish emission cap, define ratio for reserve & auctioning (if applicable) for the pilot operation of the CTX	As early as possible 2024	MONRE	For pilot operation in 2025, the scope for pilot operation should be identified earlier and data should be collected in 2024.
I.2	Develop legal document(s) to guide methods for the allocation allowances and discuss with stakeholders participating in the pilot operation to reach a consensus	As early as possible 2024	MONRE	This needs to be done after data are collected from facilities covered in the pilot operation phase
I.3	Develop legal document(s) to define carbon ownership	June 2024	MONRE	The Prime Minister requested MONRE to develop a Decree on carbon credit management
I.4	Develop legal document(s) to guide the criteria and procedures to certify allowances and carbon credits eligible for trading in the carbon market	June 2024	MONRE	The Prime Minister requested MONRE to develop a Decree on carbon credit management
I.5	Develop legal document(s) to establish and regulate the operation of the national registry system	September 2024	MONRE	Based on information from the consultation meeting with MONRE
I.6	Develop legal document(s) to establish and regulate the operation of the CTX	By the end of 2024	MOF and MONRE	Details are discussed in the previous section

I.7	Develop legal document(s) to define the financial mechanism for the operation of the carbon market	By the end of 2024	MOF	For pilot operation in 2025
I.8	Develop legal document(s) to define the measures for management and oversight of the market operation, including measures to handle violations, cost containment, market flexibility mechanisms, etc.	By the end of 2024	MONRE and MOF	For pilot operation in 2025
II	**Institutional framework**			
II.1	Establish procedures for organizations and individuals to participate in the carbon market	By the end of 2024	MONRE	For pilot operation in 2025
II.2	Assign the national registry administrator and define a collaborating mechanism with the CTX	By the end of 2024	MONRE and MOF	For pilot operation in 2025
III	**Infrastructure**			
III.1	Develop infrastructure for the national registry system	By the end of 2024	MONRE	For pilot operation in 2025
III.2	Develop infrastructure for CTX and auction platform (if applicable)	By the end of 2024	MOF	For pilot operation in 2025
III.3	Develop the database and MRV system	By the end of 2024	MONRE	For pilot operation in 2025

Source: Compiled by the Consultant (2023)

IV.5. Implementation roadmap for establishment and operation of the CTX

The detailed implementation timeframe for the establishment and pilot operation of the CTX was defined in the previous section. To meet the timeline for the pilot operation of the CTX from 2025, there is only about 1 year for different national authorities (MONRE, MOF, etc.) to take action to fill in the legal, institutional, and infrastructure gaps.

As for the overall timeline, all preparation work for the operation of the CTX will be completed in 2024 as mentioned above, and the time from 2025-2027 is to perform a pilot operation. The pilot operation scale may be different depending on the availability of the data and the resources, and the willingness and readiness of the participants. It is recommended to start at a smaller scale to reduce costs and to allow flexibility in the system.

Based on the results of the pilot operation, the improvements needed in the legal, institutional, and infrastructure framework for CTX are to be identified and executed for the full operation of the carbon market in 2028.

The following figure describes the overall roadmap for the establishment and operation of the CTX in Viet Nam.

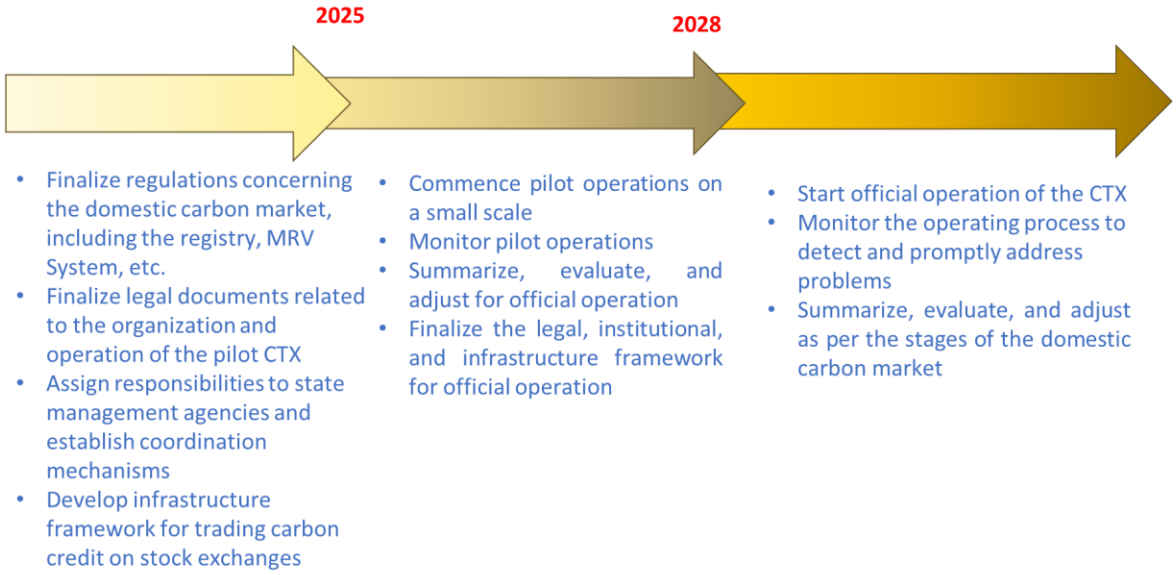

Figure 48: Roadmap for establishment and operation of the CTX

Source: Compiled by the Consultant (2023)

CONCLUSION

The CTX, as a centralized platform for handling transactions of allowances and carbon credits, is defined in LEP 2020 and is required to come into pilot operation from 2025. This is a challenging task for Viet Nam to accomplish within more than a year, given the fact that the legal, institutional framework and infrastructure for the domestic carbon market has not been fully developed. Under this Assignment, the Consultant reviewed international experiences and the national context of Viet Nam and assessed the legal, institutional, and infrastructure gaps for the establishment and operation of the CTX. Different options for addressing the identified gaps were proposed and consulted with relevant stakeholders and the recommendations were provided in this Report.

Overall, for a cost-effective and efficient approach, it is recommended that Viet Nam should make the best use of the existing infrastructure, manpower, and resources to establish the CTX rather than reinventing the wheel. However, different options have their own advantages and disadvantages. Relevant national authorities of Viet Nam (MONRE and MOF) should discuss and agree on the selected option that is most suitable for Viet Nam to move to the next steps. Then it is necessary to review, revise and update the existing regulations accordingly to reflect the changes needed to operate the CTX as designed.

This Assignment is the first study on the establishment and operation of the CTX in Viet Nam. It provides an empirical base for conceptualization of the CTX to ensure compatibility with existing national context and be in line with international best practices. In the next phase, it is necessary to perform further assessment to identify detailed design and specific model for pilot operation of the CTX. The selected model for pilot operation should also be based on the careful review and assessment of potential social, economic, and environmental impacts. Other aspects that require deeper studies in the next phase include the feasibility for application of advanced technologies (like blockchain) for operation and management of the CTX, the monitoring and oversight of trading on the CTX to ensure transparency and effectiveness, and the management of costs and revenues associated with the operation of the CTX.

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ANNEXES

Annex 1: Application of selected criteria for analysis

Criterion A – Years of operation

Description	How long has the ETS been in operation?
Assessment	**2** – More than 10 years **1** – Between 5- 10 years **0** – Below 5 years
Rationale	It is assumed that the longer the CTX has been in operation, the more lessons will be provided for Viet Nam.
Supranational	
EU ETS	**2** – More than 10 years because the ETS has been in operation since 2005
National	
Germany ETS	**0** – Below 5 years because the ETS has been in operation since 2021
Kazakhstan ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2013
Switzerland ETS	**2** – More than 10 years because the ETS has been in operation since 2008
UK ETS	**2** – Below 5 years because the ETS has been in operation within the EU ETS since 2021
China national ETS	**0** – Below 5 years because the ETS has been in operation since 2021
New Zealand ETS	**2** – More than 10 years because the ETS has been in operation since 2008
Korea ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2015
State/ provincial level	
California ETS	**2** – More than 10 years because the ETS has been in operation since 2012
Regional Greenhouse Gas (RGGI)	**2** – More than 10 years because the ETS has been in operation since 2009
Massachusetts	**1** – Between 5- 10 years because the ETS has been in operation since 2018
Washington	**0** – Below 5 years because the ETS has been in operation since 2023
Québec cap-and trade system	**1** – Between 5- 10 years because the ETS has been in operation since 2013
Beijing Pilot ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2013
Chongqing Pilot ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2014

Fujian Pilot ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2016
Guangdong Pilot ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2013
Hubei Pilot ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2014
Shanghai Pilot ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2013
Shenzhen Pilot ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2013
Tianjin Pilot ETS	**1** – Between 5- 10 years because the ETS has been in operation since 2013

Criterion B – Contextual similarity

Description	How is the country context of the ETS similar to Viet Nam?
Assessment	**Economic status:** **1** – Developing **0** – Developed **Geographical similarity:** **1** – Asian **0** – non -Asian **Jurisdictional similarity:** **1** – nationwide **0** – non-nationwide
Rationale	It is assumed that the CTX that has more contextual similarity with Viet Nam (i.e., in a developing, Asian country, and operating nationwide) will offer lessons that are more feasible to be applied in Viet Nam.
Supranational	
EU ETS	**0** – Developed, non-Asia, non-nationwide because the EU consists of mostly developed countries, is located in Europe and the ETS is operating at supranational scale
National	
Germany ETS	**1** – Developed, non-Asia, nationwide because Germany is a developed country and is located in Europe, and the ETS is operating at national scale
Kazakhstan ETS	**3** – Developing, Asia, nationwide because Kazakhstan is a developing country and is located in Central Asia, and the ETS is operating at national scale
Switzerland ETS	**1** – Developed, non-Asia, nationwide because Switzerland is a developed country and is located in Europe, and the ETS is operating at national scale
UK ETS	**1** – Developed, non-Asia, nationwide because UK is a developed country and is located in Europe, and the ETS is operating at national scale

China national ETS	**3** – Developing, Asia, nationwide because China is a developing country and is located in Asia, and the ETS is operating at national scale
New Zealand ETS	**1** – Developed, non-Asia, nationwide because New Zealand is a developed country and is located in Europe, and the ETS is operating at national scale
Korea ETS	**2** – Developed, Asia, nationwide because Korea is a developed country and is located in Asia, and the ETS is operating at national scale
State/ provincial level	
California ETS	**0** – Developed, non-Asia, non-nationwide because California is located in the USA in the America, which is a developed country and the ETS is operating at state- level
Regional Greenhouse Gas (RGGI)	**0** – Developed, non-Asia, non-nationwide because RGGI consists of 11 states in the USA in the America, which is a developed country and the ETS is operating at multi-state level
Massachusetts	**0** – Developed, non-Asia, non-nationwide because Massachusetts is located in the USA in the America, which is a developed country and the ETS is operating at state- level
Washington	**0** – Developed, non-Asia, non- nationwide because Washington is located in the USA in the America, which is a developed country and the ETS is operating at state- level
Québec cap-and trade system	**0** – Developed, non-Asia, non-nationwide because Québec is located in Canada in the North America, which is a developed country and the ETS is operating at provincial- level
Beijing Pilot ETS	**2** – Developing, Asia, non-nationwide because Beijing is a city in China, which is a developing country in Asia, and the ETS is operating at city level
Chongqing Pilot ETS	**2** – Developing, Asia, non-nationwide because Beijing is a province in China, which is a developing country in Asia, and the ETS is operating at city level
Fujian Pilot ETS	**2** – Developing, Asia, non-nationwide because Fujian is a province in China, which is a developing country in Asia, and the ETS is operating at city level
Guangdong Pilot ETS	**2** – Developing, Asia, non-nationwide because Guangdong is a province in China, which is a developing country in Asia, and the ETS is operating at city level
Hubei Pilot ETS	**2** – Developing, Asia, non-nationwide because Hubei is a province in China, which is a developing country in Asia, and the ETS is operating at city level
Shanghai Pilot ETS	**2** – Developing, Asia, non-nationwide because Shanghai is a city in China, which is a developing country in Asia, and the ETS is operating at city level
Shenzhen Pilot ETS	**2** – Developing, Asia, non-nationwide because Shenzhen is a city in China, which is a developing country in Asia, and the ETS is operating at city level

Tianjin Pilot ETS	**2** – Developing, Asia, non-nationwide because Tianjin is a city in China, which is a developing country in Asia, and the ETS is operating at city level

Criterion C – Traded volume

Description	How big is the traded volume of the ETS in 2022?
Assessment	**2** – More than 60 million tCO_2 **1** – Between 20- 60 million tCO_2 **0** – Below 20 million tCO_2 or no information
Rationale	It is assumed that the more transactions and the greater volume of allowances and carbon credits being traded, the more successful the CTX
Supranational	
EU ETS	**2** – More than 60 million tCO_2 because the EU ETS traded 8,785 million EUAs in 2022
National	
Germany ETS	**2** – More than 60 million tCO_2 because the Germany ETS traded 84.8 million EUAs and EUAAs in 2022
Kazakhstan ETS	**0** – no information because there is no information about the traded volume in the Kazakhstan ETS and the transactions are very limited
Switzerland ETS	**0** – Below 20 million tCO_2 because there is only information that 412,700 Swiss allowances actioned in 2022
UK ETS	**2** – More than 60 million tCO_2 because the UK ETS traded 431 million UKAs in the secondary market in 2022.
China national ETS	**1** – Between 20- 60 million tCO_2 because the China national ETS traded 51 million allowances in 2022
New Zealand ETS	**2** – More than 60 million tCO_2 because the New Zealand ETS traded 26 million NZUs in the primary market and more than 34 million NZUs on the exchange in 2022.
Korea ETS	**1** – Between 20- 60 million tCO_2 because the Korea ETS traded 25.8 KAUs and KOCs in 2022
State/ provincial level	
California ETS	**2** – More than 60 million tCO_2 because the 406.1 million allowances and offsets were traded in both California and Québec Cap-and-Trade Program
Regional Greenhouse Gas (RGGI)	**2** – More than 60 million tCO_2 because the 491 million tons of emission allowances were traded in RGGI in 2022
Massachusetts	**0** – Below 20 million tCO_2 because 8 million allowances were auctioned in 2022
Washington	**1** – Between 20- 60 million tCO_2 because about 27 million allowances were traded in 2022
Québec cap-and trade system	**2** – More than 60 million tCO_2 because the 406.1 million allowances and offsets have been traded in both California and Québec Cap-and-Trade Program

Beijing Pilot ETS	**0** – Below 20 million tCO_2 because 3.75 million allowances were traded in 2022
Chongqing Pilot ETS	**0** – Below 20 million tCO_2 because 4.33 million allowances were traded in 2022
Fujian Pilot ETS	**0** – Below 20 million tCO_2 because 7.66 million allowances were traded in 2022
Guangdong Pilot ETS	**0** – Below 20 million tCO_2 because 14.45 million allowances were traded in 2022
Hubei Pilot ETS	**0** – Below 20 million tCO_2 because 7.39 million allowances were traded in 2022
Shanghai Pilot ETS	**0** – Below 20 million tCO_2 because 3.19 million allowances were traded in 2022
Shenzhen Pilot ETS	**0** – Below 20 million tCO_2 because 5.3 million allowances were traded in 2022
Tianjin Pilot ETS	**0** – Below 20 million tCO_2 because 5.45 million allowances were traded in 2022

Criterion D – Transaction price

Description	How much is the transaction price of the ETS?
Assessment	**2** – More than USD 50 **1** – Between USD 10- 50 **0** – Below USD 10 or no information
Rationale	It is assumed that the higher the transaction price of an ETS, the more successful it is
Supranational	
EU ETS	**2** – More than USD 50 because the transaction price of EU ETS is around USD 80
National	
Germany ETS	**1** – Between USD 10- 50 because the transaction price of Germany ETS is around USD 30
Kazakhstan ETS	**0** – Below USD 10 because the transaction price of Kazakhstan ETS is around USD 1
Switzerland ETS	**2** – More than USD 50 because the transaction price of Switzerland ETS is around USD 80
UK ETS	**2** – More than USD 50 because the transaction price of UK ETS is around USD 90
China national ETS	**0** – Below USD 10 because the transaction price of China national ETS is around USD 8
New Zealand ETS	**2** – More than USD 50 because the transaction price of New Zealand ETS is above USD 50
Korea ETS	**1** – Between USD 10- 50 because the transaction price of Korea ETS is around USD 20
State/ provincial level	
California ETS	**1** – Between USD 10- 50 because the transaction price of California Cap-and-Trade Program is around USD 20

Regional Greenhouse Gas (RGGI)	**1** – Between USD 10- 50 because the transaction price of RGGI is around USD 15
Massachusetts	**0** – Below USD 10 because the transaction price of Massachusetts ETS is around USD 8
Washington	**0** – no information because there is no information about the transaction price in the Washington ETS
Québec cap-and trade system	**1** – Between USD 10- 50 because the transaction price of Québec cap-and trade system is around USD 30
Beijing Pilot ETS	**1** – Between USD 10- 50 because the transaction price of Beijing Pilot ETS is around USD 15
Chongqing Pilot ETS	**0** – Below USD 10 because the transaction price of Chongqing Pilot ETS is around USD 5
Fujian Pilot ETS	**0** – Below USD 10 because the transaction price of Fujian Pilot ETS is around USD 5
Guangdong Pilot ETS	**1** – Between USD 10- 50 because the transaction price of Guangdong Pilot ETS is around USD 11
Hubei Pilot ETS	**0** – Below USD 10 because the transaction price of Hubei Pilot ETS is around USD 7
Shanghai Pilot ETS	**0** – Below USD 10 because the transaction price of Shanghai Pilot ETS is around USD 6
Shenzhen Pilot ETS	**0** – Below USD 10 because the transaction price of Shenzhen Pilot ETS is around USD 7
Tianjin Pilot ETS	**0** – Below USD 10 because the transaction price of Tianjin Pilot ETS is around USD 5

Criterion E – Use of carbon credits

Description	Does the ETS allow the use of carbon credits for offsetting?
Assessment	**1** – Yes **0** – No
Rationale	As Viet Nam allows the use carbon credits to offset up to 10% of the total allowances, it is assumed that the CTX that allows the use of carbon credits will provide useful lessons for Viet Nam
Supranational	
EU ETS	**0** – No because the EU ETS has not permitted the use of carbon credits since 2021
National	
Germany ETS	**0** – No because the Germany ETS does not allow the use of carbon credits
Kazakhstan ETS	**1** – Yes because the Kazakhstan ETS allows the use of offsets with no limit.
Switzerland ETS	**0** – No because the Switzerland ETS has not permitted the use of carbon credits since 2021

UK ETS	**0** – No because the UK ETS does not allow the use of carbon credits
China national ETS	**1** – Yes because China national ETS allows the use of China Certified Emissions Reductions (CCERs) up to 5% of their verified emissions
New Zealand ETS	**0** – No because the New Zealand ETS does not allow the use of carbon credits
Korea ETS	**1** – Yes because Korea ETS has allowed the use of KOCs and certain international CERs for up to 5% of the entity's compliance obligation since 2018
State/ provincial level	
California ETS	**1** – Yes because California allows the use of offsets with limits (up to 8% for 2013-2020, 4% for 2021-2025 and 6% for 2026-2030)
Regional Greenhouse Gas (RGGI)	**1** – Yes because RGGI allows the use of offsets for up to 3.3% of an entity's liability
Massachusetts	**0** – No because the Massachusetts ETS does not allow the use of carbon credits
Washington	**1** – Yes because Washington ETS allows the use of offsets for up to 5% of an entity's liability
Québec cap-and trade system	**1** – Yes because Québec allows the use of carbon credits for up to 8% of compliance obligation
Beijing Pilot ETS	**1** – Yes because Beijing Pilot ETS allows the use of CCER credits for up to 5% of the annual allocation
Chongqing Pilot ETS	**1** – Yes because Chongqing Pilot ETS allows the use of CCER credits for up to 8% of the annual allocation
Fujian Pilot ETS	**1** – Yes because Fujian Pilot ETS allows the use of CCERs and FFCERs for up to 5% and 10% of the annual allocation, respectively.
Guangdong Pilot ETS	**1** – Yes because Guangdong Pilot ETS allows the use of CCERs and Tan Pu Hui CERs for up to 10% of the annual emissions.
Hubei Pilot ETS	**1** – Yes because Hubei Pilot ETS allows the use of CCER credits for up to 10% of the annual allocation.
Shanghai Pilot ETS	**1** – Yes because Shanghai Pilot ETS allows the use of carbon credits for up to 1-5% of the annual allocation
Shenzhen Pilot ETS	**1** – Yes because Shenzhen Pilot ETS allows the use of carbon credits for up to 20% of the annual allocation
Tianjin Pilot ETS	**1** – Yes because Tianjin Pilot ETS allows the use of CCER credits for up to 10% of the annual allocation

Criterion F – Linking

Description	Does the ETS link to others?
Assessment	**1** – Yes **0** – No
Rationale	As Viet Nam will consider linking from 2028, it is assumed that the CTX that links to other carbon markets will provide useful lessons for Viet Nam.
Supranational	
EU ETS	**1** – Yes because the EU ETS has been linked to Switzerland ETS since 1 January 2020.
National	
Germany ETS	**0** – No because the Germany ETS does not link to other carbon market
Kazakhstan ETS	**0** – No because the Kazakhstan ETS does not link to other carbon market
Switzerland ETS	**1** – Yes because the EU ETS has linked to Switzerland ETS since 1 January 2020
UK ETS	**0** – No because the UK ETS does not link to other carbon market
China national ETS	**0** – No because the China ETS does not link to other carbon market
New Zealand ETS	**0** – No because the New Zealand ETS does not link to other carbon market
Korea ETS	**0** – No because the Korea ETS does not link to other carbon market
State/ provincial level	
California ETS	**1** – Yes because California's program has linked with Québec's ETS since January 2014
Regional Greenhouse Gas (RGGI)	**0** – No because RGGI is a cooperative effort between participating states and does not link with other carbon markets.
Massachusetts	**0** – No because the Massachusetts ETS does not link to other carbon market
Washington	**0** – No because the Washington ETS does not link to other carbon market
Québec cap-and trade system	**1** – Yes because California's program has linked with Québec's ETS since January 2014
Beijing Pilot ETS	**0** – No because the Beijing Pilot ETS does not link to other carbon market
Chongqing Pilot ETS	**0** – No because the Chongqing Pilot ETS does not link to other carbon market
Fujian Pilot ETS	**0** – No because the Fujian Pilot ETS does not link to other carbon market
Guangdong Pilot ETS	**0** – No because the Guangdong Pilot ETS does not link to other carbon market

Hubei Pilot ETS	**0** – No because the Hubei Pilot ETS does not link to other carbon market
Shanghai Pilot ETS	**0** – No because the Shanghai Pilot ETS does not link to other carbon market
Shenzhen Pilot ETS	**0** – No because the Shenzhen Pilot ETS does not link to other carbon market
Tianjin Pilot ETS	**0** – No because the Tianjin Pilot ETS does not link to other carbon market

Annex 2: Summary of the legal framework for the establishment and operation of CTX in selected case-studies

Annex Table 1: Key legislation for the establishment and operation of CTX in selected case studies

NO.	NAME OF LEGAL DOCUMENTS	GENERAL DESCRIPTION
I	**UK ETS**	
1	Greenhouse Gas Emissions Trading Scheme Regulations 2003 (SI 2003/3311) Amendment: • Greenhouse Gas Emissions Trading Scheme (Amendment) Regulations 2004 (SI 2004/3390) • Greenhouse Gas Emissions Trading Scheme Regulations 2005	• Provide the framework for a greenhouse gas emissions trading scheme in the UK to implement Directive 2003/87/EC of the European Parliament and the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (the "Emissions Trading Directive"). • The 2005 Regulations consolidate the 2003 Regulations and the 2004 Regulations with substantive amendments when the UK participated in the EU ETS.
2	Greenhouse Gas Emissions Trading Scheme Order 2020 (SI 2020 No.1265) (the Order) Amendments of the Order: • Amendment 2020 (SI 2020 No.1557) • Amendment 2021 (SI 2021 No.1455) • Amendment 2022 (SI 2022 No. 454) • Amendment No. 2 2022 (SI 2022 No. 1173)	• Establishes the UK Emissions Trading Scheme or UK ETS, covering GHG emissions from power and heat generation, energy-intensive industries, and aviation. It is the successor, in the UK, to the EU Emissions Trading System (established by Directive 2003/87/EC) as the UK left the EU. • The Order includes basic elements of the UK ETS (establishment, allowances and caps, MRV), specific requirements for installations and aviation, charging, monitoring compliance, and enforcement, as well as a mandate for a periodic performance review of the UK ETS.
3	Greenhouse Gas Emissions Trading Scheme Auctioning Regulations 2021	• Regulate auctions of allowance, including provisions for basic elements of the auction, auction process, auction calendar, platform, transaction reporting, and fees and costs.
4	Monitoring and Reporting Regulation (Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018)	• An EU Regulation given effect by the Order and modified by the Order to be applicable for the UK ETS. • Provides rules for the monitoring and reporting of GHGs and activity data including instructions for development of monitoring plan; calculation and monitoring methodology for emissions from installations and aircraft operators; data management and control; reporting.

5	Verification Regulation (Commission Implementing Regulation (EU) 2018/2067 of 19 December 2018) a	• An EU Regulation given effect by the Order and modified by the Order to be applicable for the UK ETS. • Establish a framework for accreditation of verifiers for verification of GHG emissions report in the ETS including obligations, requirements for verifiers, and procedures for verification, as well as accreditation of ETS verifiers.
6	Free Allocation Regulation (Commission Delegated Regulation (EU) 2019/331 of 19 December 2018)	• An EU retained law that is applicable in the UK after Brexit and amended by the Order and its amendments. • Provide rules on free allocation of emission allowances, application, data reporting and monitoring.
7	Activity Level Change Regulation (Commission Implementing Regulation (EU) 2019/1842 of 31 October 2019)	• An EU retained law that is applicable in the UK after Brexit and amended by the Order and its amendments. • Provide rules for adjustment of allowance allocation due to activity level changes.
II	**New Zealand ETS**	
1	Climate Change Response Act 2002 Recent amendments to the Act (from 2019): • Climate Change Response (Late Payment Penalties and Industrial Allocation) Amendment Act 2023 • Climate Change Response (Auction Price) Amendment Act 2021 • Climate Change Response (Extension of Penalty Transition for Forestry Activities with Low Volume Emissions Liabilities) Amendment Act 2022 • Climate Change Response (Emissions Trading Reform) Amendment Act 2020 • Climate Change Response (Zero Carbon) Amendment Act 2019	• Obliges and gives effect to New Zealand's international obligations to the UNFCCC, Kyoto Protocol, and the Paris Agreement • Amendments relating to late payment penalties for low-volume forestry activities and industrial allocations • Amendments relating to auctions to sell New Zealand units, limits and price control settings for units, and the Climate Change (Auctions, Limits, and Price Controls for Units) Regulations 2020 • Amendments relating to the settings of industrial allocation and the penalty that applies when small forestry participants fail to surrender or repay units by the due date • Amendments relating to ETS compliance tools including publishing of participants' emissions and removal data, introduction of auctioning of New Zealand units, phasing out of industrial allocations, etc. • Amendment Act that provides a framework to develop and implement clear and stable climate change policies. The changes establish the Climate Change Commission, set GHG emission

	Regulations under Climate Change Response Act 2002: • Climate Change (Forestry) Regulations 2022 • Climate Change Response (Infringement Offences) Regulations 2021 • Climate Change (Auctions, Limits, and Price Controls for Units) Regulations 2020 • Climate Change (Synthetic Greenhouse Gas Levies) Regulations 2013 • Climate Change (Emissions Rulings: Fees and Charges) Regulations 2010 • Climate Change (Eligible Industrial Activities) Regulations 2010 • Climate Change (Agriculture Sector) Regulations 2010 • Climate Change (Waste) Regulations 2010 • Climate Change (Other Removal Activities) Regulations 2009 • Climate Change (Stationary Energy and Industrial Processes) Regulations 2009 • Climate Change (Unique Emissions Factors) Regulations 2009 • Climate Change (Unit Register) Regulations 2008 • Climate Change (Liquid Fossil Fuels) Regulations 2008	reduction target, set a system of emissions budgets, etc.
III	**California Cap-and-Trade**	
1	Assembly Bill 32 California Global Warming Solutions Act 2006	• Establish California's 2020 GHG Reduction Target, requiring the California Air Resources Board (CARB) to adopt a Scoping Plan for achieving the

		target, and authorizing CARB to include a cap-and-trade program as a mechanism to help achieve the target
2	Senate Bill 32 California Global Warming Solutions Act of 2006: emissions limit	• Set a target of achieving 40% below the 2020 GHG Reduction Target by 2030
3	Assembly Bill 398 California Global Warming Solutions Act of 2006: market-based compliance mechanisms: fire prevention fees: sales and use tax manufacturing exemption	• Reaffirm legislative support for a cap-and-trade program through December 31, 2030
4	Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Latest Amendments to the Regulation • Board Resolution 18-51 (12/13/2018) and Final Regulation Order • Board Resolution 18-4 (3/22/2018) and Final Regulation Order • Board Resolution 17-21 (7/27/2017) and Final Regulation Order	• Cover various aspects of the mechanism including: GHG allowance budgets, compliance requirements for covered entities, direct allocations of California GHG allowances, disposition of allowances, auction and sale of California GHG allowances, trading and banking, ARB offset credits and registry offset credits, enforcement and penalties, and linkage to external GHG ETS.
IV	**Korea ETS**	
1	(Law) Framework Act on Low Carbon Green Growth - <No. 9931, 2010. 1. 13> - <No. 10599, 2011. 4. 14> - <No. 11676, 2013. 3. 23> - <No. 11965, 2013. 7. 30> - <No. 14122, 2016. 3. 29> - <No. 14811, 2017. 4. 18> - <No. 14839, 2017. 7. 26> - <No. 15101, 2017. 11. 28> - <No. 15489, 2018. 3. 20> - <No. 16133, 2018. 12. 31> - <No. 16646, 2019. 11. 26>	• Establish a framework to promote the development of the national economy by laying the foundation necessary for low carbon, green growth and by several methods including the establishment of an Integrated Information Management System for Greenhouse Gases (Article 45) and Introduction of the Cap-and-Trade System (Article 46)
2	(Law) Framework Act on Carbon Neutrality and Green Growth for Coping with Climate Crisis - <No. 18469, 2021. 9. 24> - <No. 19208, 2022. 12. 31>	• Strengthen policy measures to reduce greenhouse gases and adapt to climate change, which required the Korean government to operate a Greenhouse Gas Emissions Trading System (Article 25) and Establish a Climate Response Fund based on the Revenues generated

	- <No. 19308, 2023. 3. 28> - <No. 19430, 2023. 6. 9>	from the allocation of emission permits (Article 69)
3	(Law) Act on the Allocation and Trading of Greenhouse Gas Emission Permits - <No. 11419, 2012. 5. 14> - <No. 11690, 2013. 3. 23> - <No. 14839, 2017. 7. 26> - <No. 15836, 2018. 10. 16> - <No. 17104, 2020. 3. 24> - <No. 18469, 2021. 9. 24> - <No. 20172, 2024. 1. 30>	• Establish a framework for the following: o establishment of master plans for emission trading systems; o designation of business entities eligible for allocation and allocation of emission permits, o trading of emission permits; o reporting, verification, and certification of amounts of emissions; o surrender, carryover, borrowing, offset, and termination of emission permits; o penalty provisions and administrative fines.
4	(Decree) Enforcement Decree on the Act on Allocation and Trading of Greenhouse Gas Emission Permits - <No. 30944, 2020. 8. 18> - <No. 31548, 2021. 3. 23> - <No. 32503, 2022. 2. 22> - <No. 32557, 2022. 3. 25> - <No. 33913, 2023. 12. 12>	• Set out the rules and details for how the 'Act on the Allocation and Trading of Greenhouse Gas Emission Permits' will be put into action
5	(Directive) Guideline on the Reporting and Certification of Emissions under the Emission Trading System - <No. 2016-103, 2016. 6. 8> - <No. 2017-63, 2017. 3. 27> - <No. 2018-73, 2018. 5. 2> - <No. 2019-245, 2020. 1. 1> - <No. 2021-10,2021. 1. 1> - <No. 2021-278, 2021. 12. 21>	• Guidelines pertaining to the emissions statement submission and information disclosure in accordance with Article 24, and certification procedures in accordance with Article 25 of the Act
6	(Directive) Guideline on the Verification for the Operation of the Emission Trading System - <No. 2016-15, 2016. 6. 1> - <No. 2017-12, 2017. 5. 30> - <No. 2018-70, 2018. 5. 2> - <No. 2021-112,2021. 6. 8>	• Establish the criteria for the designation and management of verification agencies, delineating the specific tasks and protocols associated with the verification activities conducted by verification auditors under the 'Act on the Allocation and Trading of Greenhouse Gas Emission Permits'
7	(Directive) Guideline on the Allocation, Adjustment, and Cancellation of Emission Permits - < No. 2020-270, 2020. 12. 24>	• Establish a criterion for designating entities and define the methodology for calculating emission allowance quota, as well as specifics and procedures in governing the additional allocation and cancellation of allowances

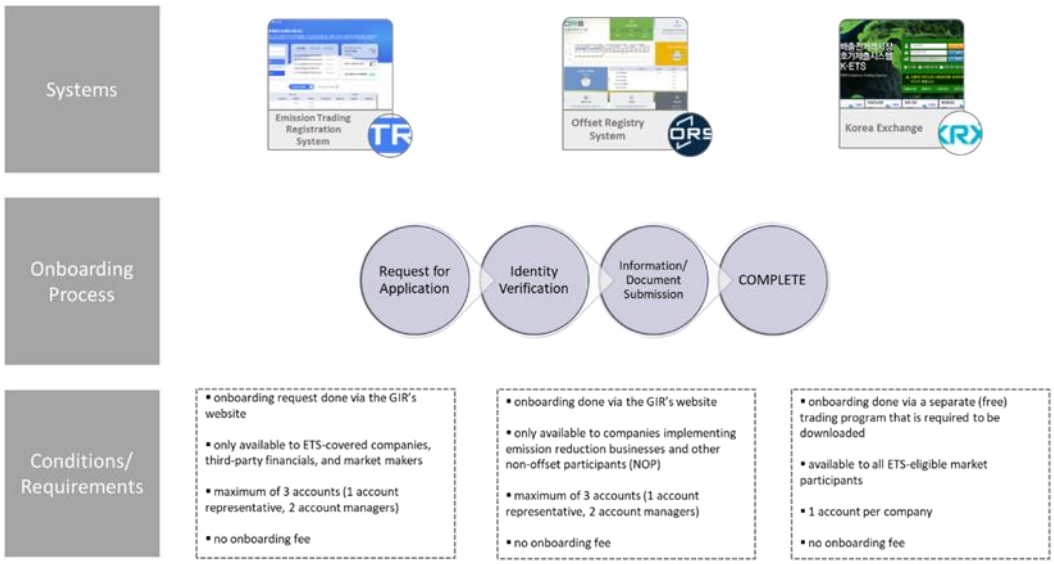
	-<No. 2021-277, 2021. 12. 30>	
8	(Directive) Guideline on the Validity Assessment and Certification of Emission Reduction of Offsets - <No. 2016-103, 2016. 6. 8> - <No. 2017-36, 2017. 3. 27> -< No. 2018-79, 2018. 5. 2> - <No. 2018-127, 2018. 6. 28> - <No. 2021-22,2021. 1. 22> -<No. 2021-88, 2021. 5. 21>	• Establish procedures for the feasibility assessment and certification of external projects under Articles 48 and 49 of the 'Enforcement Decree on the Act on Allocation and Trading of Greenhouse Gas Emission Permits'
9	(Official Bulletin) Regulation on the Transaction of Emission Permits - <No. 2016-105, 2016. 6. 8> - <No. 2018-67, 2018. 5. 1>	• Establish a system to monitor allowances and facilitate seamless trading as mandated by the 'Act on the Allocation and Trading of Greenhouse Gas Emission Permits'
10	(Official Bulletin) Regulation on Greenhouse Gas Emission Exchanges - <No. 2016-14, 2016. 6. 1> -<No. 2016-33, 2016. 12. 30> -<No. 2018-68, 2018. 5. 1>	• Supervise the emission exchanges under Article 22 of the 'Act on the Allocation and Trading of Greenhouse Gas Emission Permits'
11	(Official Bulletin) Regulation on the Supplementary Permit Allocation for Auction and Market Stabilization Measure - <No. 2018-71, 2018. 5. 2> - <No. 2019-50, 2019. 3. 7> - <No. 2020-108,2020. 5. 8> - <No. 2023-60, 2023. 3. 31>	• Establish the procedures governing the allocation of emission rights through auction mechanisms

Source: Compiled by the Consultant

Annex 3: Further information about K- ETS emission trading

Onboarding Process

South Korea's sophisticated data information system, enabled by digital systems and IoT technology, facilitates an easy and straightforward onboarding process for market participants in the GIR and the KRX.



Annex Figure 1: K-ETS Onboarding Information

Source: Compiled by the Consultant based on GIR and KRX (2023)

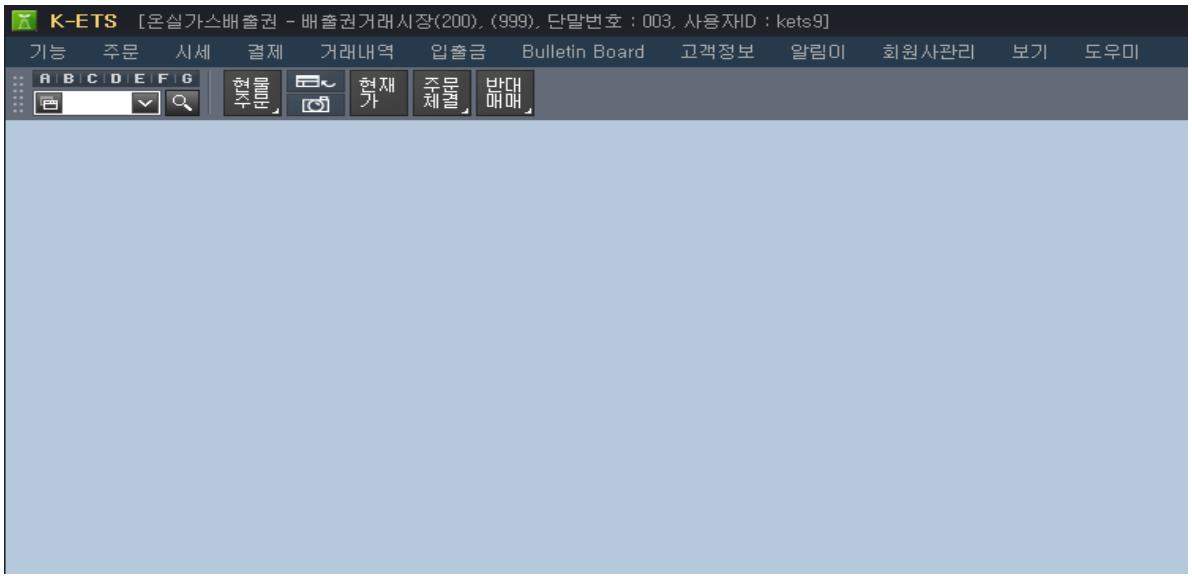
The onboarding process for setting up an account requires applicants to first consent to the provision and management of confidential information and data and then complete a mandatory identification verification process. This two-step process ensures that the system can easily identify eligible applicants and direct them to the sign-up page for input of personal or company information.

Onboarding requests are done through the official homepages of the participating systems, with the exception of KRX, which requires users to download a separate program. There is no onboarding fee for any ETS participating party, but the number of allowed accounts may be limited depending on the system.

Participants that are eligible to create an account in the KRX are classified as follows: general members, external business reduction member, and brokerage member. General members are those who can participate in self-trading of allowances and offset credits and are companies qualified under 'Article 12 (Member Qualification) of the ETS Act' such as companies subject to ETS obligations, Korea Development Bank (KDB), Industrial Bank of Korea (IBK), and Korea Export-Import Bank (KOEXIM), and any other designated market maker. External business reduction members are companies that operates emission reduction projects and participate in trading of offset credits. A brokerage member is an emission trading brokerage company that participates in self-trading and consignment trading of allowances registered under the Financial Investment Services and Capital Markets Act.

Trading Platform (Quotation-Input Program)

The KRX designed a user-friendly interface for traders to place and manage general and negotiated orders, and other functions such as account management, payment settlement option, transactions history, real-time bids and offers, and daily price trends, among others.



Annex Figure 2: Main Interface of the KRX

Source: Korea Exchange (2017)

Registered market participants must provide relevant business information to verify their eligibility to trade carbon credits on KRX. The required information includes banking information to check for real-time funds availability and GIR registration information to automatically connect with the registries and government databases. All this information, except for information protected by confidentiality laws, is stored on the storage server to facilitate the production of statistics and market data.

Annex Figure 3: Account Information in the KRX

Source: Korea Exchange (2017)

The quotation and trading process in the KRX is designed to facilitate an efficient transaction. By allowing market participants to submit quotations and trade in real time, the exchange helps to ensure that prices are reflective of the current supply and demand conditions.

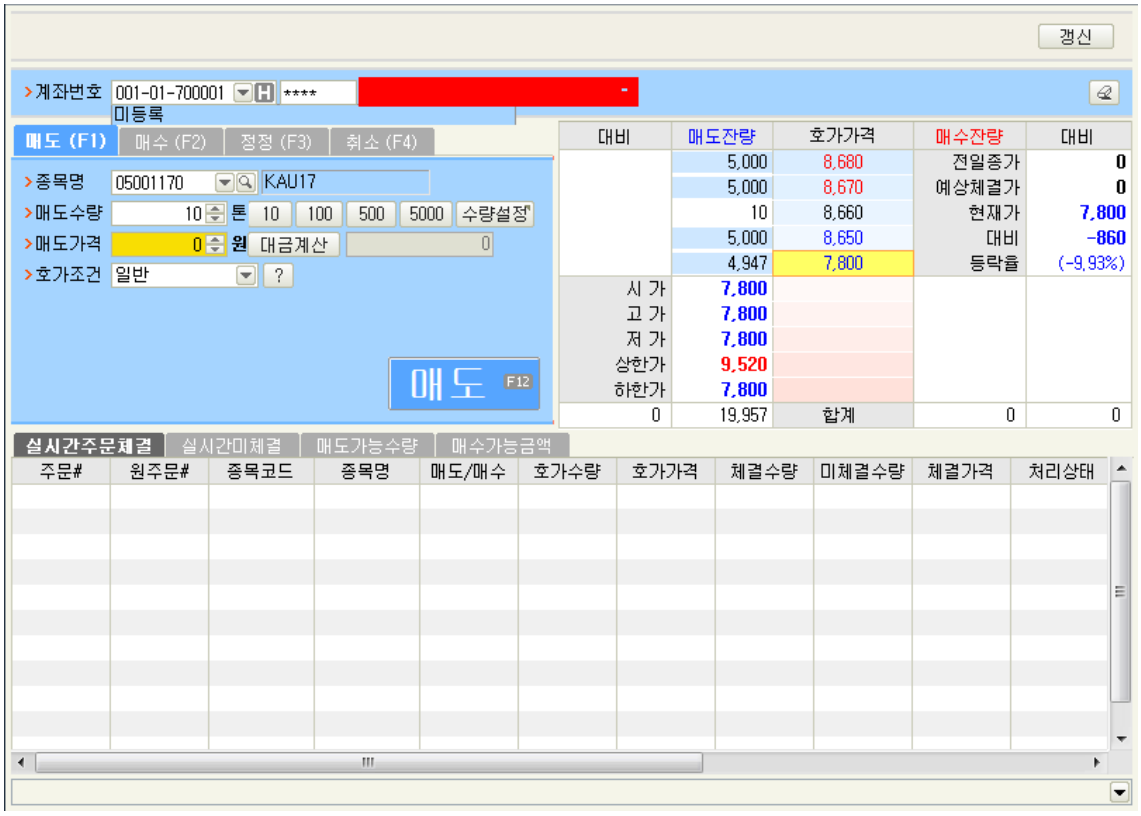
The process begins with market participants submitting quotations for the commodity they wish to buy or sell. Each quotation, with a minimum of 1 ton and maximum of 100,000 tons, is submitted in the form of a bid-ask spread, from Monday through Friday between 09:00 – 12:00. Trading hours for auctions are from 13:00 to 14:00 on the auction day.

Annex Table 2: Trading Specifications in KRX

Contract	KAU (vintage attached, yearly expiry)
Underlying	KAU equals one emission permit of one tCO2e
Contract Volume	1 ton
Minimum Volume	1 ton
Price Flux	±10% based on previous day's closing price
Form of Trading	Continuous trading
Transaction Fee	0.1% of the total trade amount (transaction fee: 0.08%, clearing settlement fee: 0.02%)
Fulfillment Date	Same day; immediate
Allowance Transfer/Delivery Date	Automatic; KRX account linked with GIR
Allowance Sale	Sales need to be backed by a sufficient fund in the nominated bank account

Source: Korea Exchange (2017)

Once quotations have been submitted, the exchange matches buyers and sellers at the best available price. For quotations submitted between 09:00 and 10:00, a single settlement price is determined at 10:00. For quotations submitted between 10:00 and 11:30, prices are matched in real time. Any quotations that have not been concluded by 11:30 or those submitted between 11:30 and 12:00 are concluded at a single price at 12:00, and closing prices are determined at this time. Traders will be charged a total fee of 0.1% of the total transaction amount.



Annex Figure 4: Quotation Input (Sell) in the KRX under K-ETS

Source: Korea Exchange (2017)

Traders can also trade in the KRX through bilateral means, which involves negotiating and executing trades directly with counterparties. To trade bilaterally in the KRX, traders can search and contact counterparties on the Bulletin Board inquiry screen. This screen provides a list of all counterparties who are interested in trading a particular commodity. Once a trader has identified a counterparty, they can contact them directly to negotiate the trading conditions. Once the trading conditions have been agreed upon, the trader must submit a negotiated sale price. This is done by entering the counterparty's account number, the time when the negotiation was completed, and other required information. Orders that were placed on the same day can be canceled.

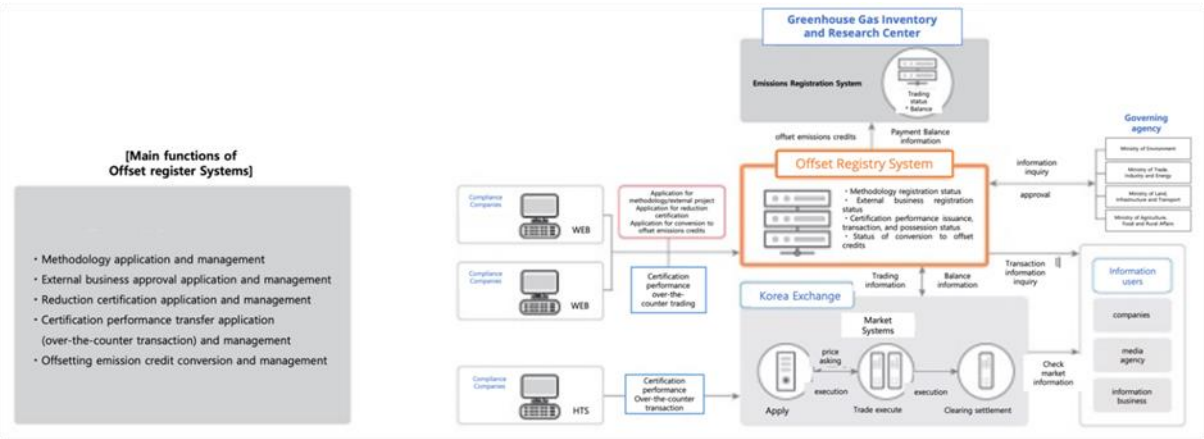
A price limit has been placed by the KRX to prevent excessive volatility in prices. Price limits can help to prevent big price fluctuations by making it more difficult for traders to manipulate the market. Lower and upper price limits in the KRX are set at 10% of the previous day's closing price.

Annex 4: The ORS Operation Structure under K-ETS

ORS is a public registry that records information on carbon offset projects, including project plans, certification records, and other relevant information, to facilitate the issuance, transfer, and disposal of offset credits. A number of its functions include:

- Recording and managing external business applications, feasibility assessment, registration, monitoring, verification, certification, etc.
- Recording and managing the issuance, transfer, and disposal of external business certification performance and conversion to offset credits, etc.
- Other functions deemed necessary by the Minister of Environment

The ORS operation structure under K-ETS is demonstrated in the figure below.



Annex Figure 5: The ORS Operation Structure under K-ETS

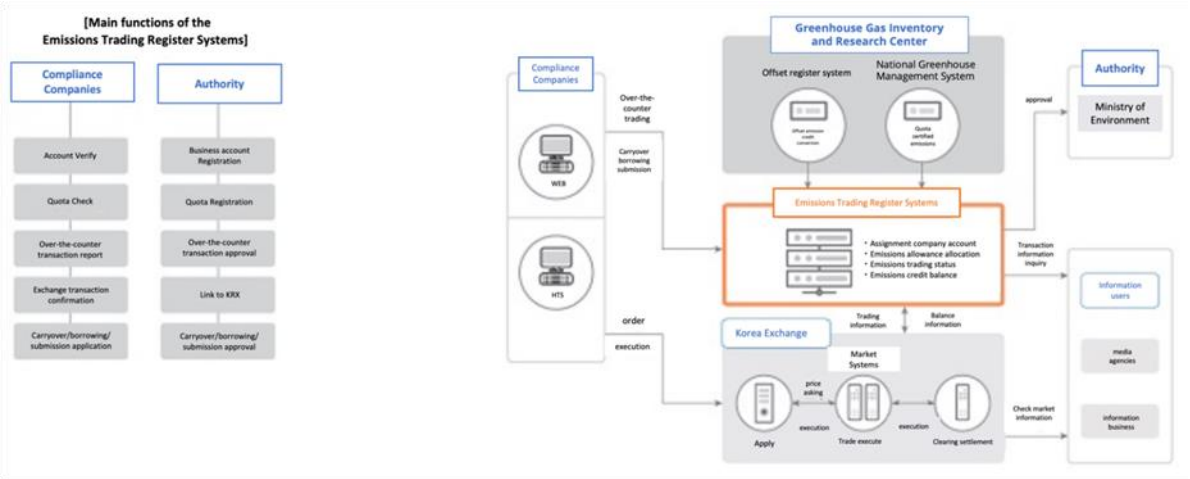
Source: Greenhouse Gas Inventory and Research Center (n.d.-a.)

Annex 5: The ETRS Operation Structure under K-ETS

ETRS is a registry for the trading of emissions permits under the ETS. It is responsible for recording and maintaining the following data, among others:

- Total number of emissions permits by commitment period and compliance year;
- Account of emission permits under the name of each business entity eligible for allocation and other private person or corporation and the number of emissions permits they each hold;
- Account for the management of emission permits in reserve (additional allocation of emission allowances, market-making activities, market stabilization reserves, etc.);
- Amount of emission permits transferred/canceled;
- Quantity of emission permits submitted;
- The carryover/borrowing amount of emission permits;
- The number of offset credits;
- The emission plan and verification report.
- The total number of emissions permits by commitment period and compliance year, greenhouse gas certified emissions.

ETRS Operation Structure under K-ETS is demonstrated in the figure below.



Annex Figure 6: The ETRS Operation Structure under K-ETS

Source: Greenhouse Gas Inventory and Research Center (n.d.-a.)

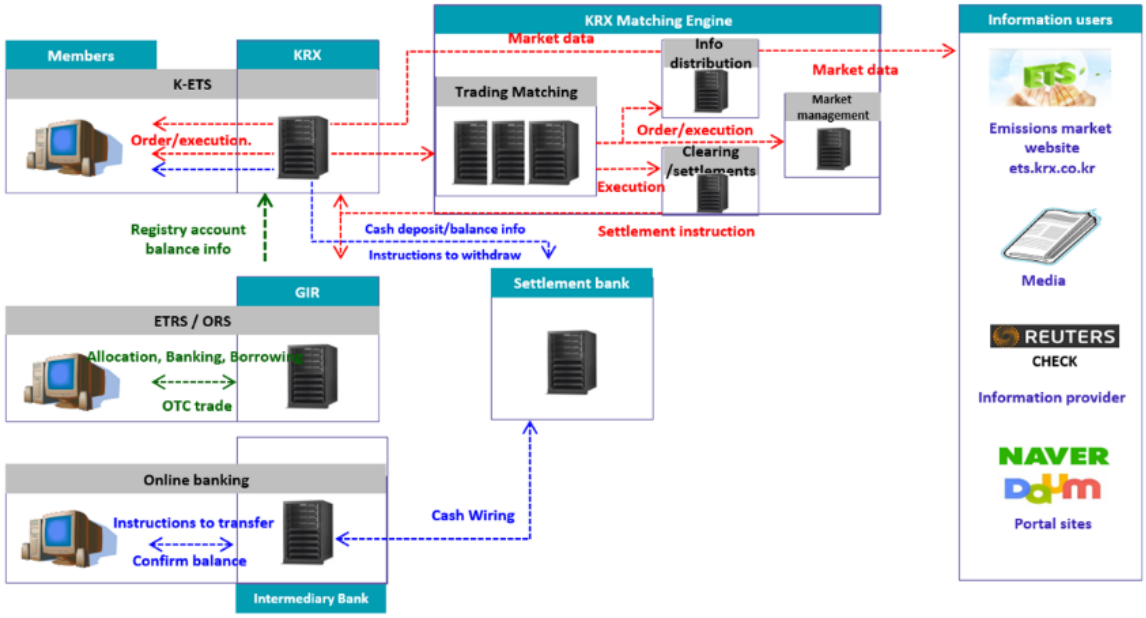
Annex 6: The KRX carbon credit trading infrastructure

The KRX has established a dedicated carbon credit trading infrastructure within its existing framework. The overall network architecture consists of interwoven systems between the KRX and all carbon-related components, such as the registries and applicable regulations from government-related agencies, and banking and payment services from financial institutions.

The KRX's carbon credit trading process flows through several servers, namely the trading server, matching engines, clearing server, and market data server. The trading server is responsible for processing orders and matching buyers and sellers. Information is then transferred to the matching engines, which efficiently execute trades. Once a trade is executed, information is simultaneously forwarded to the clearing server to connect with the settlement banks and the market data server, which provides real-time market data to traders, such as prices, trading volume, and other vital information.

Beyond the trading infrastructure also lies intricate security and risk management systems that protect the organization from cyberattacks and monitor the market for risks and fraudulent activities.

Overall, the KRX carbon credit trading infrastructure is shown in the figure below.



Annex Figure 7: KRX's Carbon Trading Infrastructure

Source: Korea Exchange (2021)

Annex 7: General legal documents and financial regulations related to the carbon market in Viet Nam

General legal documents and financial regulations related to the carbon market in Viet Nam are demonstrated in the table below.

Annex Table 3: Legal documents and financial regulations in the carbon market in Viet Nam

NO.	NAME OF LEGAL DOCUMENTS	GENERAL DESCRIPTION
I	**GENERAL LEGAL DOCUMENT RELATED TO THE CARBON MARKET**	
A	**LAWS**	
1	Law No. 50/2010/QH12 dated 17 June 2010 issued by the National Assembly on Economical and Efficient Ese of Energy	• Identify principles, regulations, measures, and policies to encourage economical and efficient use of energy • Emphasize priority in developing clean energy technology and increasing the proportion of renewable energy use • The MOIT is responsible for guiding and implementing annual and five-year plans for economical and efficient use of energy. Detailing of energy audit, content, training program, authority to issue, recognize, and revoke energy auditor certificates • Regulate energy labelling and management of devices and equipment with energy yield below the minimum level
2	Law No. 17/2012/QH13 dated 21 June 2012 issued by the National Assembly on Water resources	Regulate basic investigation activities of water resources including assessment, warnings, and forecasts of the impact of climate change on water resources. Water resource strategy formulation and water resource planning will have to be based on forecasts of climate change impacts on water sources.
3	Law No. 16/2017/QH14 dated 15 November 2017 issued by the National Assembly on Forestry	Regulate forest inventory activities to reduce GHG emissions, limit deforestation, and manage forests sustainably. Organizations and individuals that cause large GHG emissions must pay for forest carbon absorption and storage services. The law ensures forest management combined with response to climate change, development of forestry tree varieties adapted to climate change, and research into solutions to preserve forest biodiversity. Encourages international cooperation in the forestry sector to

		achieve sustainable development goals and other international commitments of Viet Nam
4	Law No. 72/2020/QH14 dated 17 November 2020 issued by the National Assembly on Environmental Protection	Regulate provisions related to the carbon market and CTX: • Article 91: Mitigation of GHG emissions • Article 139: Organizing and developing the domestic carbon market
B	**DECREE**	
5	Decree No. 06/2022/ND-CP dated 07 January 2022 issued by the Government on GHG emission reductions and Ozone layer protection	Regulate the organization and development of the domestic carbon market, including: • Article 16: Participants in the domestic carbon market • Article 17: Roadmap and deployment time of domestic carbon market • Article 18: Certification of eligible carbon credit, GHG allowances on the domestic carbon market • Article 19: Exchange of GHG allowances and carbon credits on domestic carbon market • Article 20: Registration of programs and projects according to carbon exchange and offsetting mechanisms • Article 21: Responsibility for the development of the domestic carbon market: MOF is responsible for the formulation and establishment of the CTX and promulgating financial management mechanisms for the operation of the carbon market
6	Decree No. 107/2022/ND-CP dated 28 December 2022 issued by the Government on the Experimental transfer of Emission reductions and financial management under Emission reduction payment in the North Central Region	• Provide for experimental ER transfer and financial management under ERPA in respect to forest environmental services according to regulations in Clause 3 Article 61 and Article 63 of the Law on Forestry; • Apply to regulatory agencies, forest owners, organizations, households, individuals, and residential community whose activities involve emissions reduction and absorption of GHG emissions from natural forests in 06 provinces of the North Central Region.
C	**PRIME MINISTER'S DECISION**	
7	Decision No. 1474/QD-TTg dated 05 October 2012 issued by the Prime Minister	Promulgate a specific list of schemes, projects, and tasks of the national action plan on climate change for

	promulgating together with this Decision the National Action Plan on Climate Change period 2012 - 2020	the period 2012-2020 and priority programs and projects for the period 2012-2015.
8	Decision No. 1775/QD-TTg dated 21 November 2012 issued by the Prime Minister approving of Project of GHG emission management; Management of carbon credit business activities to the world market	Specialized tasks and projects under the scheme: • Conduct a national GHG inventory for the base year 2005 according to IPCC guidelines and develop basic emission scenarios to 2020 for the energy, agriculture, LULUCF, and waste sectors • Set a target of emission reduction and increase of absorption of GHG by 2020 • Regulate management for carbon credit business activities to the world market inside and outside the framework of the Kyoto Protocol
9	Decision No. 2068/QD-TTg dated 25 November 2015 issued by the Prime Minister approving The Development Strategy of Renewable Energy of Vietnam by 2030 with a vision to 2050	• Develop orientation from now to 2030: (i) Invest and develop the power plants using on-grid renewable energy; (ii) Develop and use the renewable energy source for the supply of thermal energy; (iii) Develop and use biofuel source • Develop orientation by 2050: Focus resources, exploit, and use a maximum of renewable energy potential in the country • Provide orientation for the development of hydropower, biomass energy, wind power, and solar energy for electricity production • Provide mechanisms and policies to form a market for renewable energy. The final customers using power are purchasing power from the national electricity system, implementing the development of power source using the renewable energy with the main purpose of ensuring their electricity demand may apply the net metering mechanism.
10	Decision No. 2053/QD-TTg dated 28 October 2016 issued by the Prime Minister promulgating the Plan to implement the Paris Agreement on Climate Change	Promulgate specific tasks to implement the Paris climate agreement. Including the task of mitigating GHG emissions in the period 2016-2020, 2021-2030 and the task of adapting to climate change in the period 2016-2020, 2021-2030 as well as the tasks of preparing resources and establishing an MRV system, develop and improve policies, institutions.

11	Decision No. 01/2022/QD-TTg dated 18 January 2022 issued by the Prime Minister promulgating the list of sectors, GHG emitting establishments subject to GHG inventory	Regulate 06 sectors and 1912 facilities that are subject to conduct GHG inventory
12	Decision No. 876/QD-TTg dated 22 July 2022 issued by the Prime Minister approving the Action program for Transition to Green Energy and Mitigation of Carbon dioxide and Methane emissions from Transportation	• By 2030: Improve energy efficiency, and speed up the transition to electricity and green energy in transportation which are available in terms of technology, institutions, and sources to fulfill the commitment in the NDC and the goal of mitigating methane emissions in Viet Nam • By 2050: Rationally develop transport methods, and vigorously carry out the transition to electricity and green energy of all equipment, vehicles, and infrastructures of transport, aiming at achieving net-zero GHG emissions by 2050 • Regulate the roadmap for the transition to green energy
13	Decision No. 888/QD-TTg dated 25 July 2022 issued by the Prime Minister approving for Scheme setting out tasks and solutions for the implementation of outcomes of the 26th conference of the parties to the United Nations framework convention on Climate Change	• Set the goal of forming a carbon credit exchange mechanism and a domestic carbon credit trading market. By 2030, the domestic carbon market will be operated and connected with regional and world carbon markets; • Set the task of promulgating a mechanism to encourage the implementation of carbon pricing tools; • Pilot implementation and establishment of a domestic carbon market in the period 2022-2030 chaired by MOF.
14	Decision No. 896/QD-TTg dated 26 July 2022 issued by the Prime Minister approving the National Strategy for Climate Change until 2050	• Focus resources on responding to climate change, developing financial mechanisms and carbon markets • Institutionalize a low-carbon development model, circular economy, effectively apply carbon pricing tools, including carbon tax, GHG emission allowances and carbon trade exchange, connecting with regional and world markets • Increase enterprises' capacity to access and participate in participating programs and projects following carbon credit trading and offset and developing carbon market

		• Develop high quality experts regarding GHG inventory, GHG reduction appraisal, carbon market development, ozone layer protection, and climate change adaptation
D	**CIRCULAR**	
15	Circular No. 01/2022/TT-BTNMT dated 07 January 2022 issued by MONRE detailing the implementation of the Law on Environmental Protection in response to Climate Change	• Issue guidance on assessing impacts, vulnerabilities, risks, losses, and damages due to climate change; • Issue a template report for appraisal of GHG emission mitigation; • Promulgate a list, instructions for use of controlled substances.
16	Circular No. 17/2022/TT-BTNMT dated 15 November 2022 issued by MONRE providing technical regulations on methods for measurement, reporting, appraisal of reduction of GHG emissions and GHG inventory development in waste management	• Provide a process for conducting sector-level GHG inventories. Guidance on GHG inventory at sector-level and facility-level; • Guidance on measuring, reporting, and appraising establishments' GHG emission reduction in the field of waste management.
17	Circular No. 23/2023/TT-BNNPTNT dated 15 December 2023 issued by Ministry of Agriculture and Rural Development providing technical regulations on Methods for measurement, reporting, appraisal of greenhouse gas emission mitigation results and greenhouse gas inventory in the Forestry sector	• Guide on measuring and reporting GHG emission mitigation results in the Forestry sector • Guide on GHG inventory in the forestry sector
18	Circular No. 38/2023/TT-BCT dated 27 December 2023 issued by MOIT providing technical regulations on Methods for measurement, reporting, appraisal of mitigation of GHG emission and GHG inventory for industry and trade sector	• Provide technical process for GHG inventory at sector-level and facility-level in the industry and trade sector • Promulgate a list of activity data for sector-level and facility-level GHG inventory • Issue facility-level GHG inventory methods • Guide on measuring, reporting, and appraising GHG emissions mitigation in the industry and trade sector

II	**FINANCIAL REGULATIONS RELATED TO THE CARBON MARKET AND CTX**	
A	**FINANCIAL REGULATIONS RELATED TO CERs**	
19	Law No. 14/2008/QH12 dated 03 June 2008 issued by the National Assembly on Corporate Income Tax	Provide for corporate income taxpayers, taxable incomes, tax-exempt incomes, tax bases, tax calculation methods, and tax incentives
20	Law No. 13/2008/QH12 dated 03 June 2008 issued by the National Assembly on Value-added Tax	Provide for objects subject and not subject to value-added tax, taxpayers, tax bases, tax calculation methods, and tax credit and refund
21	Law No. 32/2013/QH13 dated 19 June 2013 issued by the National Assembly on the Amendments to the law on Corporate Income Tax	Amend and supplement a number of articles of the Law on Corporate Income Tax
22	Law No. 97/2015/QH13 dated 25 November 2015 issued by the National Assembly on Fees and Charges	• Issue a list of fees and charges. In particular, the transfer fee for certificates and GHG emission reduction credits is regulated by MOF
23	Law No. 106/2016/QH13 dated 06 April 2016 issued by the National Assembly amending and supplementing a number of articles of the law on Value- Added Tax, the Law on Excise Tax and the Law on Tax Administration	• Amend to some Articles of the Law on Value-added tax No. 13/2008/QH12, which is amended under the Law No. 31/2013/QH13; • Amend to some Articles of the Law on special excise duty No. 27/2008/QH12, which is amended under the Law No. 70/2014/QH13; • Amend to some Articles of the Law on Tax administration No. 78/2006/QH11, which is amended under Law No. 21/2012/QH13 and Law No. 71/2014/QH13.
24	Decree No. 209/2013/ND-CP dated 18 December 2013 issued by the Government detailing and guiding the implementation of the Law on Value- Added Tax	Regulate that organizations and individuals receiving emission transfer payments are not required to declare and calculate value-added tax
25	Decree No. 218/2013/ND-CP dated 26 December 2013 issued by the Government detailing and guiding the implementation of law on Corporate Income Tax	Regulate incomes from the first-time transfer of CERs of enterprises granted with emission reduction certificates. Subsequent transfers shall be liable to CIT under regulations

26	Decision No. 130/2007/QD-TTg dated 02 August 2007 issued by the Prime Minister on a number of financial mechanisms and policies applied to investment projects under the Clean Development Mechanism	• Define that MONRE is the National Designated Authority in CDM • Regulate some financial policies for CDM projects: Time to sell CERs and CERs selling price, CERs selling fees, subsidy policy to products of CDM projects, etc.
27	Joint Circular No. 58/2008/TTLT-BTC-BTNMT dated 04 July 2008 issued by MOF and MONRE guiding implementation of some articles under Decision 130/2007/QD-TTg	• Set out fee rates for selling CERs for 08 fields of construction and investment in project implementation • Provide regulations on collection, payment, management, and use of collected fees as well as price subsidies for CDM project products • Collect, submit, manage, and use CERs selling fees as well as subsidies to products of CDM projects
28	Joint Circular No. 204/2010/TTLT-BTC-BTNMT dated 15 December 2010 issued by MOF and MONRE amending and supplementing some provisions of Joint Circular 58/2008/TTLT-BTC-BTNMT	• Owners of CERs, when transferring or selling CERs back home (for foreign investors), must report to the Ministry of Natural Resources and Environment and the Vietnam Environmental Protection Fund. Pay the CERs selling fee 15 working days in advance from the date of transfer of CERs to the buyer or transfer back to the country • Propose regulations on management and use of CERs from CDM projects using ODA capital. For CDM projects using ODA capital from the state budget, the CERs obtained are owned by the State. For projects using fully re-borrowed ODA capital, the CERs obtained are owned by the investor • Fees for selling CERs are collected in foreign currency or Vietnamese Dong, based on the average exchange rate on the foreign currency market announced by the State Bank of Vietnam at the time of fee collection
29	Circular No. 219/2013/TT-BTC dated 31 December 2013 issued by MOF guiding the implementation of the Law on Value- Added Tax	Regulate that any taxpayer that receives a payment for transfer of emission permit shall make receipts for spending according to spending purposes
30	Circular No. 78/2014/TT-BTC dated 18 June 2014 issued by MOF guiding the	Regulate that tax-exempt incomes from transfer of CERs must satisfy the condition that the sale or

	implementation of the government's Decree 218/2013/ND-CP of 26/12/2013, detailing and guiding the implementation of the law on corporate income tax	transfer of emission reduction certificates is certified by the competent agency in charge of environment
B	**FINANCIAL REGULATIONS RELATED TO THE CTX**	
31	Law No. 83/2015/QH13 dated 25 June 2015 issued by the National Assembly on State Budget	Deal with the planning, implementation, audit, statement, and supervision of state budget; responsibilities and entitlements of agencies, organizations, units, and individuals relevant to state budget
32	Law No. 54/2019/QH14 dated 26 November 2019 issued by the National Assembly on Securities	Provide for securities activities and the securities market; rights and obligations of organizations and individuals in the securities market; organization of the securities market; state management of securities and the securities market
33	Decree No. 120/2016/ND-CP dated 23 August 2016 issued by the Government detailing and guiding the implementation of a number of articles of the Law on Fees and Charges	Provide for the declaration, collection and payment of fees and charges; the management and use of fees; final settlement of fees and charges; responsibilities of state agencies and organizations for collection, payment, management and use of fees and charges
34	Decree No. 45/2022/ND-CP dated 07 July 2022 issued by the Government on penalties for administrative violations in the field of environmental protection	Provide for administrative offences, penalties, fines, remedial measures against administrative offences, power to make administrative offence notices, power to impose penalties for administrative offences against environmental protection. These include violations of regulations on preventing, combating, and overcoming pollution, degradation, and waste incidents; reduce GHG emissions and protect the ozone layer

Source: Compiled by the Consultant (2023)

Annex 8: General legal documents related to the securities market in Viet Nam

General legal documents related to the securities market in Viet Nam are demonstrated in the table below.

Annex Table 4: General legal documents related to the securities market in Viet Nam

No.	NAME OF LEGAL DOCUMENTS	GENERAL DESCRIPTION
A	**LAW**	
1	Law No. 54/2019/QH14 dated 26 November 2019 issued by the National Assembly on Securities	Regulate securities activities and the securities market; rights and obligations of organizations and individuals in the securities market; organization of the securities market; state management of securities and the securities market
B	**DECREE**	
2	Decree No. 153/2020/ND-CP dated 31 December 2020, issued by the government on prescribing private placement and trading of privately placed corporate bonds in the domestic market and offering of corporate bonds in the international market	Regulate the issuance and trading of privately placed corporate bonds both domestically and internationally; corporate bond information webpage, and reporting on corporate bonds, management; supervision and responsibility of relevant authorities and organizations
3	Decree No. 155/2020/ND-CP dated 31 December 2020, issued by the Government on the elaboration of some articles of the law on securities	Regulate the organization of securities trading market, securities registration, clearing and settlement, members of VSDC, organizations directly opening accounts, and clearing banks
4	Decree No. 156/2020/ND-CP dated 31 December 2020, issued by the Government on prescribing penalties for administrative violations against regulations on securities and securities market	Regulate administrative violations, penalties, fines, remedial measures, enforcement of penalties, and remedial measures. It also delineates the authority to compile records and the authority to administratively penalize violations in the securities and stock market sector
5	Decree No. 158/2020/ND-CP dated 31 December 2020, issued by the Government on derivatives and derivative market	Regulate derivative trading organizations, clearing and settlement service providers, the organization of the derivative market, trading members, special trading members, and market makers, and clearing and settlement for derivative transactions

6	Decree No. 59/2021/ND-CP dated 18 June 2021, issued by the Government on prescribing financial management and performance assessment of Vietnam Exchange and Vietnam Securities Depository and Clearing Corporation	Regulate the mechanism for financial management and performance assessment of Vietnam Exchange and Vietnam Securities Depository and Clearing Corporation regarding some aspects: Intercorporate investments, revenues, expenses, performance assessment and ranking, financial management, supervision and performance assessment of subsidiaries of VNX
7	Decree No. 14/2023/ND-CP dated 20 April 2023, issued by the Government on providing for functions, tasks, powers, and organizational structure of MOF	Regulate the position and functions of MOF as a government agency and functions to perform the state management of securities
C	**DECISION**	
8	Decision No. 48/2015/QD-TTg dated 08 October 2015, issued by the Prime Minister on functions, tasks, powers, and organizational structure of SSC affiliated to MOF	Regulate the position and function of SSC as the organization affiliated to MOF, which has responsibilities of giving advice and assisting MOF to perform the state management of securities activities and the securities market; directly manage and supervise the securities activities and the securities market; manage services activities pertaining to securities activities and the securities market according to laws
9	Decision No. 2398/2017/QD-BTC dated 21 November 2017, issued by MOF on the issuance of regulations on the organization and operation of HNX	Define the objectives and functions of HNX, with a primary focus on managing listing, registration, securities, and bond auctions in line with legal regulations and delegated authority. Additionally, its pivotal role includes overseeing compliance with securities laws and market regulations by trading members, derivatives traders, auction participants, and investors, in accordance with legal provisions and delegation from SSC.
10	Decision No. 2399/2017/QD-BTC dated 21 November 2017, issued by MOF on the issuance of regulations on the organization and operation of HOSE	Regulate the objectives and functions of HOSE, with its key functions including organizing activities related to stock listing, securities trading, and securities auctions as per legal regulations and delegated authority; and overseeing compliance with securities laws and stock market regulations by trading members, listing organizations, and the trading activities of participating investors at the Stock Exchange, in

		accordance with legal provisions and the delegation from SSC
11	Decision No. 37/2020/QD-TTg dated 23 December 2020, issued by the Prime Minister on the establishment, organization, and operation of Vietnam Exchange	Regulate the establishment of VNX as the parent company-subsidiary company model on the basis of re-arrangement of HNX and HOSE. Accordingly, VNX manages and oversees HNX and HOSE in accordance with securities laws, corporate laws, management laws, and the regulations governing the use of state capital invested in production and business activities within enterprises, as well as the organizational charter and operations guidelines
12	Decision No. 1275/2023/QD-BTC dated 14 June 2023, issued by MOF on regulations on the organization and operation of VSDC	Regulate functions and operations of VSDC. Accordingly, VSDC has the function of organizing the registration, depository, clearing, and settlement of securities; overseeing the registration, depository, clearing, and settlement activities of securities transactions on the stock market per securities laws; and performing other functions and tasks as stipulated by the law. It also aims to safeguard the legal rights and interests of investors participating in the securities market
D	**CIRCULAR**	
13	Circular No. 95/2020/TT-BTC dated 16 November 2020, issued by MOF on guidance on supervision of securities transactions on the securities market	Provide guidance on supervision of transactions of securities that are listed or registered for transactions on the securities market.
14	Circular No. 96/2020/TT-BTC dated 16 November 2020, issued by MOF providing guidelines on the disclosure of information on the securities market	Provide regulations on disclosure of information on Vietnam's securities market, with disclosing entities including public companies; organizations making public offering of corporate bonds; issuers that make initial public offering of shares; organizations that have corporate bonds listed; securities companies, securities investment fund management companies; VNX; HNX; HOSE; VSDC; investors that have to disclose information as prescribed by law
15	Circular No. 119/2020/TT-BTC dated 31 December 2020, issued by MOF on registration,	Provide guidance on securities registration, depository, clearing, and settlement of securities transactions under a central counterparty

	depository, clearing and settlement of securities	clearing house, along with detailing the reporting mechanism
16	Circular No. 121/2020/TT-BTC dated 31 December 2020, issued by MOF on prescribing operation of securities companies	Provide business functions of securities companies in Viet Nam, including: Corporate governance, management, and operations functions; services, business lines or core business functions; financial practices; corporate reporting approaches
17	Circular No. 57/2021/TT-BTC dated 12 July 2021, issued by MOF on introducing a roadmap for the reorganization of markets for shares, bonds, derivatives, and other securities	Provide reorganization of markets for shares, fund certificates, and covered warrants, reorganization of the bond market, and rules for the reorganization of derivative market
18	Circular No. 58/2021/TT-BTC dated 12 July 202, issued by MOF providing guidelines for some articles of Government's Decree No. 158/2020/ND-CP dated 31 December 2020 on derivatives and derivative market	Provide guidelines for some Articles of Decree No. 158/2020/ND-CP, including trading, clearing, and settlement for derivative transactions, encompassing stock-index futures contracts and government-bond futures contracts; and activities of members of VNX and VSDC
19	Circular No. 06/2022/TT-BTC dated 08 February 2022, issued by MOF on providing guidelines on compliance supervision by the state securities commission regarding operations in the field of securities of VNX and its subsidiaries and VSDC	Provides guidelines on the supervision by SSC of compliance with the law on securities and securities market by VNX and its subsidiaries, and VSDC during their organization and performance of securities operations
20	Circular No. 69/2023/TT-BTC dated 15 November 2023, issued by MOF providing amendments to Circular No. 57/2021/TT-BTC dated 12 July 2021 of MOF introducing a roadmap for the reorganization of markets for shares, bonds, derivatives, and other securities	Modify the roadmap for the reorganization of the stock, bond, derivative, and other securities markets outlined in Circular No. 57/2021/TT-BTC. Under this adjustment, HOSE will specialize in the stock market, investment fund certificates, and right certificates, while HNX will prioritize the bond and derivative market by the conclusion of 2026

Source: The Consultant (2023)

Annex 9: Description of account types in the securities exchange in Viet Nam

The description of account types in the securities exchange and its functions is outlined in the table below.

Annex Table 5: The description of account types in the securities exchange in Viet Nam

The trading account	The securities depository account
The investor • An investor is forced to open a securities trading account at a securities company to carry out securities transactions; • An investor is allowed to open multiple securities trading accounts according to the principle that the investor is allowed to open only 01 trading account at each securities company. The securities investment fund management company is allowed to open multiple securities trading accounts at each securities company according to the following principles: • 01 securities trading account is opened to carry out its own securities trading activities; • 02 securities trading accounts are opened to manage the investment portfolio of entrusting investors, including 01 account serving securities trading activities of domestic entrusting investors and 01 account serving securities trading activities of foreign entrusting investors; • For each investment fund or securities investment company managed by the fund management company is entitled to open 01 securities trading account under its name at each securities company. A branch in Viet Nam of a foreign fund management company is entitled to open 02 securities trading accounts at each securities company, including 01 account serving its own securities trading activities and 01 account serving securities trading activities of foreign entrusting investors.	The Depository Member: Open a securities depository account at VSDC in order to conduct transactions with its securities. Each Depository Member may only open one securities depository account at VSDC and may not open a securities depository account at another Depository Member, except for special cases. The investor and the foreign depository receipt issuer: • An investor may only open one securities depository account at each depository member; • Foreign investors open securities depository accounts in accordance with relevant laws; • Foreign depository receipt issuers may open a securities depository account after being granted a securities trading code. The securities investment fund and securities investment company: Each fund/company may only open one securities depository account at solely one custodian bank in accordance with relevant laws The fund management company: Must open a separate securities depository account for the company and for each securities investment fund managed by the company. In case of investment portfolio management, at each custodian bank, the fund management company is allowed to open 02 securities depository accounts in the name of the fund management company on behalf

Each securities company is allowed to open securities trading accounts according to the following principles: ● The securities company that engages in proprietary trading and is a member of the Stock Exchange is allowed to open only 01 proprietary trading account right at such securities company and is not allowed to open any securities trading account at other securities companies; ● If the securities company cancels its membership of the Stock Exchange, it may use a securities trading account at another securities company that is a member of the Stock Exchange to handle the remaining securities on the proprietary trading account; ● The securities company is allowed to open 01 market-making account for the listed and registered securities and 01 secured warrant hedging account at such company to carry out transactions for these operations. ● The securities company that is not a member establishing the exchange-traded fund (ETF) is allowed to open a securities trading account at the member establishing the exchange-traded fund, This account is used to exchange ETF certificates on the primary market and sell ETF certificates on the secondary market with respect to component securities and ETF certificates obtained from the exchange and purchase of component securities and ETF certificates on the secondary market to carry out exchange transactions, and not used to carry out other securities transactions. A foreign securities-trading organization is allowed to open 02 securities trading accounts at each securities company as follows: ● 01 trading securities account is opened to carry out its proprietary trading; ● 01 brokerage trading account is opened to provide brokerage services to other foreign investors.	of investors (01 securities depository account for domestic investors and 01 securities depository account for foreign investors). Branches of foreign fund management companies in Viet Nam: may open 02 securities depository accounts at DMs, of which 01 securities depository account for themselves and 01 securities depository account for portfolio management for foreign investors. Foreign securities companies are allowed to open 02 separate securities depository accounts at DMs, of which 01 securities depository account for themselves and 01 securities depository account for the company's clients. An insurance enterprise may open 02 securities depository accounts to separately manage investments from equity and insurance premiums when making investments on the stock market. In case an insurance enterprise has a foreign investor holding more than 50% of its charter capital, the securities deposited in the securities depository account from the equity source shall be governed by the law on foreign ownership on the securities market. Foreign investment funds and foreign investment organizations are managed by multiple fund management companies, investment organizations belonging to foreign governments or investment and financial organizations belonging to international financial institutions of which Vietnam is a member may open more than one securities depository account on the principle that with each securities trading code issued, one can open one securities depository account at a custodian bank.

An insurer is allowed to open 02 securities trading accounts at each securities company as follows: ● 01 securities trading account is used to carry out trading using the equity. Regarding the insurer over 50% of charter capital which is held by the foreign investor, the securities trading on this account is subject to regulations of law on foreign ownership on securities market; ● 01 securities trading account is opened to carry out trading using the revenue from domestic insurance premiums of policyholder funds in accordance with regulations of law on business insurance. The securities trading on this account are not governed by regulations of law on foreign ownership on securities market.	

Source: Compiled by the Consultant based on MOF (2020b) (2020c)

Annex 10: Transaction process in the securities exchange in Viet Nam

The transaction process in the centralized market involves several keys, which are demonstrated below:

Step 1: Opening a securities trading account

To engage in securities trading, investors must open a securities trading account with a securities company. If the customer only seeks brokerage services for buying and selling securities, they can open a standard trading account. The securities company must manage customer's trading deposits separately from its own funds, and it cannot directly receive funds for securities trading from customers. Customers of the securities company must open a deposit account at a designated bank chosen by the securities company.

Step 2: Placing securities trading orders

Investors can place trading orders using one of two methods:

- Placing or receiving orders using paper order forms directly at the trading counter or submitting order forms to the securities company.
- Placing or receiving orders through electronic trading.

After verifying the order, the securities company forwards the trading order to the stock exchange.

Step 3: Order matching and trade result notification

At the closing time of the trading session, the stock exchange reports trading results for each security code traded on the securities exchange to VSDC and securities companies.

Step 4: Payment and completion of the transaction

Based on the trade result received from the stock exchange, the securities company prepares a trade confirmation report and sends it to VSDC for payment processing. Simultaneously, after obtaining trade results, the securities company provides confirmation to the customer. This confirmation holds the same legal value as a payment notice with the customer.

VSDC performs trade result matching, which is provided by the stock exchange and reports from securities companies to initiate clearing and settlement. Within the T+x days (T: trading day, x: delayed day for clearing, depending on securities types), the VSDC will transfer ownership of securities from the seller to the buyer, and the designated payment bank will handle funds transfer from the buyer to the seller through the securities companies' bank accounts.