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CHINA'S CARBON EMISSION TRADING SYSTEM: PAST, PRESENT, AND FUTURE

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Abstract

China's carbon emission trading system is a key market-based instrument for actively tackling climate change and accelerating the low-carbon transition across society. Since 2010, China has explored the emission trading system by establishing pilots and officially launched the National Carbon Emission Trading System (National ETS) in 2021. After four years of operation, the National ETS now covers approximately 3,600 enterprises in four sectors: power generation, iron and steel, cement, and aluminum smelter. The total volume of greenhouse gas emissions covered is about 8 billion tonnes, making it the worlds largest carbon market in terms of emissions coverage. As one of the earliest emerging economies to explore emission trading system, China's experience provides valuable lessons for other developing countries.

This report provides a comprehensive review of the historical evolution, current policy design, performance evaluation, and outlook of China's carbon emission trading system. The first section of the report reviews the policy context of China's climate actions and systematically introduces the development process of China's carbon emission trading system, including pilot explorations, the launch of the National ETS, and sectoral expansion. The second section elaborates in details on the institutional and policy design of the National ETS, including the intensity-based cap setting, allowance allocation, monitoring, reporting and verification (MRV) system, trading rules, compliance management, and offset mechanisms. The third section reviews the construction of regional carbon markets and summarizes the main lessons learned. The fourth section provides medium- and long-term recommendations for further improvement of the National ETS, drawing on international experience and domestic low-carbon policy directions. The report offers systematic analysis and decision-making references for policymakers, industry participants, and the academic community.

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Chapter 1

Overview of China's Carbon Emission Trading System

1.1. Background

Recent climate data underscores the critical urgency of addressing climate change. The year 2024 was the hottest year on record as the global average temperatures surpassed pre-industrial levels by 1.55 °C.[1] This breach of the 1.5 °C threshold narrows the window for achieving the goal of the *Paris Agreement*, highlighting the pressing need for immediate and decisive action.

Climate change-induced extreme weather also poses a significant threat to China. One study predicts China will face more extreme heatwaves, heavy rainfall, floods, glacier retreats, permafrost degradation, and coastal storm damage.[2] Another research estimates that China's annual direct economic losses related to climate change have reached an average of 50 billion USD. Without effective mitigation and adaptation measures, it is expected these losses will continue to increase.[3]

Combating climate change is one of the priorities for China. Along with other parties, China signed the Paris Agreement in 2016. China's announcement in September 2020 to peak CO_2 emissions before 2030 and achieve carbon neutrality before 2060—widely known as the "30-60 goals"—reflects a strong and long-term commitment to climate action. This ambition has since been reaffirmed through the updated Nationally Determined Contributions (NDCs)[4] submitted in 2021 and the release of the First Biennial Transparency Report[5] on Climate Change in 2024, underscoring China's ongoing engagement in global climate governance.

As a market-based instrument that encourages the driving down of greenhouse gas (GHG) emissions, the Emission Trading System (ETS) is widely adopted by governments worldwide to achieve their NDCs goals. As of April 2025, there are 38 operational ETSs globally, with an additional 20 under consideration or development. These existing ETSs regulate 23% of global GHG emissions. Jurisdictions with ETSs represent 58% of the global GDP and approximately one-third of the world's population.[6] International experience demonstrates that the ETS can support achieving climate targets with cost effectiveness by providing economic incentives for reduction in fossil fuel usage and emissions cuts across covered sectors. Unlike the command-and-control method, where the effectiveness of the measure relies mainly on regulators' judgment and capacities, ETS incentivizes diverse stakeholders and participants to utilize their expertise in applying low-cost emission reduction solutions, thereby reducing overall mitigation costs. ETS also drives green technology innovation and industrial investment, offering an effective tool for balancing economic development and emission reduction.[7]

Drawing on international experience, China has also implemented carbon pricing policies to promote emission reductions in key domestic sectors, which include the mandatory compliance-based National Carbon Emission Trading System (National ETS) as well as a crediting system. The National ETS started trading in July 2021, covering the power generation sector emissions starting from 2019. In March 2025, the expansion of the National ETS was announced to cover the emissions of iron and steel, cement, and

aluminum smelter sectors in 2024 and onward, which is required to fulfill the compliance obligation in 2025 and onward. Since then, the National ETS covers approximately 8 billion tonnes CO_2 emissions each year—more than 60% of China's total CO_2 emissions.[8] It should be noted that the National ETS adopts an output-based benchmark allocation approach without an absolute cap.

In addition to the National ETS, China has also established a crediting system, the National Voluntary Greenhouse Gas Emission Reduction Trading (the National Voluntary Market) in January 2024. The National Voluntary Market and the National ETS constitute China's National Carbon Emission Trading System and are interconnected through an offsetting mechanism for China Carbon Emission Allowances (CEAs) surrendering. The Chinese Certified Emission Reductions (CCER) generated from the National Voluntary Market can also be used for compliance purposes in the regional carbon emission trading systems (regional ETSs), meeting companies' voluntary commitment and other purposes. As the National Voluntary Market develops, it could significantly incentivize the deployment and development of low-carbon technologies and society-wide emissions reduction efforts.

1.2. Development of China's Carbon Emission Trading System

Since 2005, China has started to implement market-based policy tools to reduce GHG emissions. By 2025, China has established eight regional ETSs, the National ETS and the National Voluntary Market.

China has participated in international emission trading through the Clean Development Mechanism (CDM) since 2005 to understand the theory and design methods of carbon markets gradually. Starting in 2011, China began exploring the establishment of domestic ETSs, and launched ETS pilots in two provinces and five cities, including Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong, and Shenzhen from 2013–2014. Subsequently, Fujian Province, designated as China's first ecological civilization experimental province, launched its provincial ETS in 2016. Sichuan Province also applied to the central government for permission to conduct CCER transactions at the Sichuan United Environmental Exchange in 2023.

With years of practice, the seven pilot ETSs and the Fujian Provincial ETS have formed China's eight regional ETSs, each with articulated rules and regulatory frameworks. Nine CCER trading centers, including the one in Sichuan, have been set up. Further details on these developments are elaborated in Chapter 3 of this report.

In November 2013, *The Decision of the Central Committee of the Communist Party of China (CPC) on Several Major Issues Concerning Comprehensively Deepening the Reform* was adopted, which elevated the establishment of National ETS to be one of the key tasks in "comprehensively deepening reform".[9] This decision marked the beginning of China's design phase for its National ETS. Building on the lessons learned from the pilots, China started the design and development of its National ETS.

In December 2017, the National Development and Reform Commission (NDRC) organized a working conference of the National ETS and released *the Work Plan for the Construction of the National Carbon Emission Trading Market (Power Generation Sector)*. This marked the completion of the National ETS design phase and the beginning of its construction.[10]

In March 2018, NDRC's responsibility for addressing climate change, including the designing and implementation of ETS policies, was transferred to the Ministry of Ecology and Environment (MEE). This arrangement reflects the enhancement of the synergy between addressing climate change and preventing environmental pollution, making strong efforts to ecological and environmental protection. Following the transition, the MEE began integrating carbon market development with its ecological and environmental protection efforts while also enhancing the National ETS's legal framework, institutional regulations, data management, infrastructure construction, capacity building, and other key elements. Figure 1 illustrates the milestones of establishing the National ETS.

After two years of preparation, the *Measures for the Administration of Carbon Emission Trading (Trial)* was published in December 2020, and this policy has been officially enforced since February 1, 2021. The allowance allocation plan and a list of key emitting entities (covered entities) were published in December 2020. The release of these documents marked the successful launch of China's National ETS. By June 2025, China's National ETS has completed three compliance cycles. It is currently under the 4th compliance cycle. The first compliance cycle covered emissions from the power sector for 2019–2020; the second compliance cycle covered emissions from the power sector for 2021–2022; the third compliance cycle

covered emissions from the power sector for 2023; and the fourth compliance cycle covers emissions from the power, iron and steel, cement, and aluminum smelter sectors for 2024. Each compliance cycle consists of a complete process including emissions monitoring, reporting, verification, pre-allocation and adjustment of allowances, allowance trading, and allowance surrender. After exploration in the first two compliance cycles, the National ETS shifted from surrendering allowances every two years to every year, further encouraging key emitting entities to strengthen their routine carbon management and trading activities. Figure 2 illustrates the main activities of power sector in the National ETS during the first four compliance cycles.

The CEA prices have steadily increased over the three completed compliance cycles. The carbon price remained stable at 40–60 yuan/tonne (approximately 6–8 USD/tonne) during the first compliance cycle. In the second compliance cycle, the price increased steadily, reaching 50–82 yuan/tonne (about 7–11 USD/tonne). By the end of 2024, the composite price for market closing was 97.49 yuan/tonne (about 14 USD/tonne).[11] The 2022 China Carbon Price Survey revealed that stakeholders expect China's national carbon price to "rise steadily" over the coming years, projecting it to reach 87 yuan ($12) per tonne by 2025.[12] By April 2024, the CEA price had already exceeded the 2025 projection. With the tightening of benchmarks and the expansion of sectoral coverage under the National ETS, the CEA prices could reach almost 300 yuan ($42) per tonne by 2030.[13]

By the end of 2024, the cumulative allowances transaction volume was 630 million tonnes, and the cumulative transaction value was 43.03 billion yuan (about 5.93 billion USD).[14] The transaction volume and transaction value in 2024 amounted to 189 million tonnes and 18.11 billion yuan (about 2.49 billion USD). These increasing figures are the result of continuous improvement since the launch of the National ETS and reflect the growing confidence of market participants in the future of the National ETS. More details are elaborated in Chapter 2.

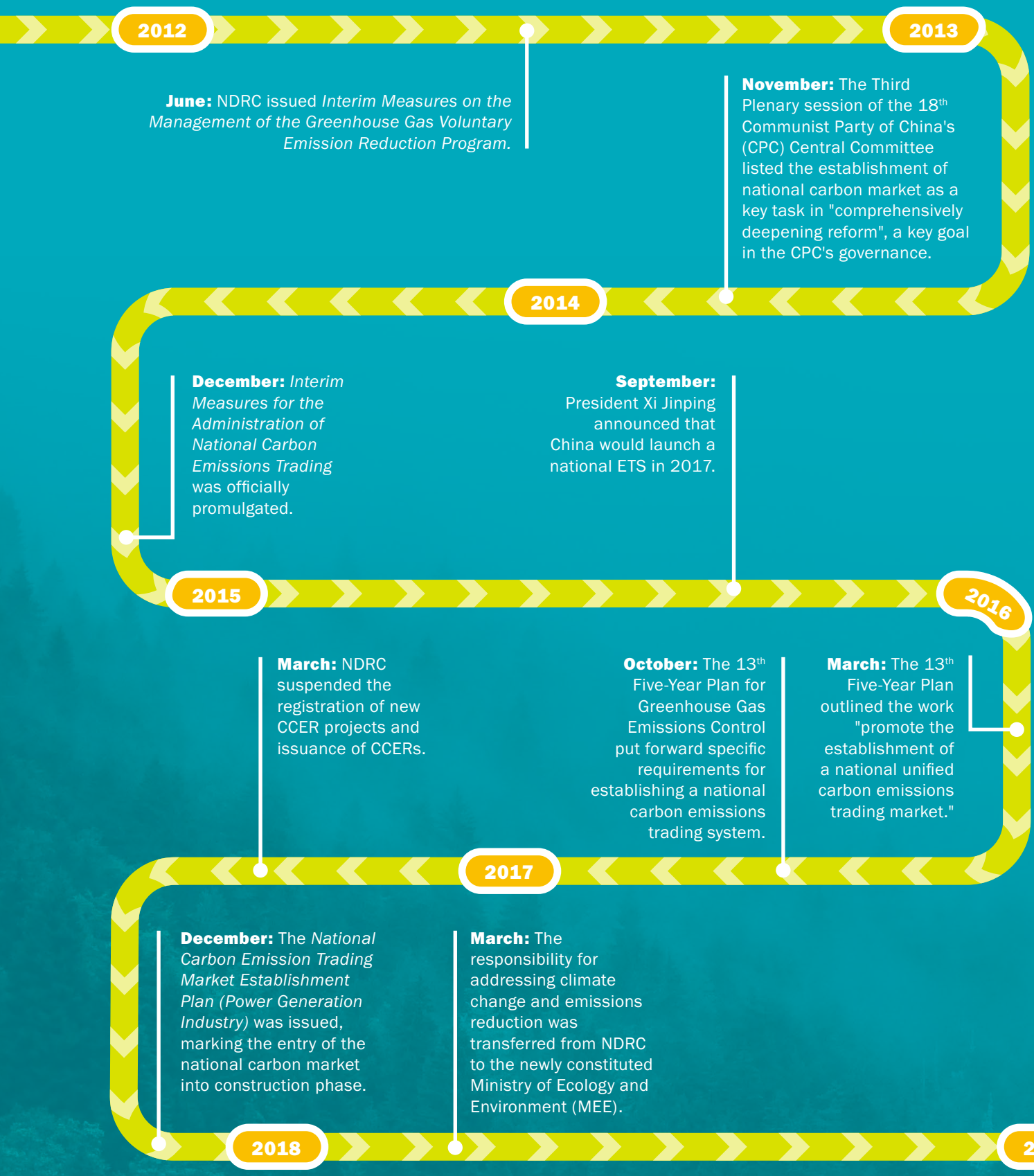


FIGURE 1
Milestones of carbon market development in China

2026

March: The *Work Plan of China's National ETS Covering Cement, Iron and Steel and Aluminum Smelter Sectors* was issued.

2025

January: The Accounting and Reporting Guidelines and the Verification Guidelines for Iron and Steel Sector were issued.

2024

September: The Accounting and Reporting Guidelines and the Verification Guidelines for Cement and Aluminum Sectors were issued.

February: State Council released *Interim Regulations for the Management of Carbon Emission Trading.*

October: *Measures for the Administration of Voluntary Greenhouse Gas Emission Reduction Trading (Trial)* was released.

October: The *2023-2024 Implementation Plan for National Carbon Emissions Trading Total Allowances Setting and Allocation for Power Generation Industry* was issued.

January: The national voluntary greenhouse gas emission reduction trading market was launched.

March: The *2021-2022 Implementation Plan for National Carbon Emissions Trading Total Allowances Setting and Allocation (Power Generation Industry)* was released.

2023

December: The Central Economic Work Conference proposed, for the first time, to "create conditions for the soonest transition from controlling energy consumption and energy intensity to controlling total carbon emissions and carbon intensity".

December: The first compliance cycle of the National ETS was successfully completed.

2022

July: The National ETS officially started trading.

June: Shanghai Energy and Environment Exchange (SEEE) issued the *Announcement on Issues related to National Carbon Emissions Trading*, which clarifies the method of trading, time period, account and other matters related to national carbon emission trading.

May: *Rules for the Administration of Carbon Emissions Registration (Trial), Rules for the Administration of Carbon Emissions Trading (Trial), Rules for the Administration of Carbon Emissions Settlement (Trial)* was issued.

2021

2020

December: The Ministry of Finance issued *Interim Provisions on the Accounting Treatment of Carbon Emissions Trading.*

December: The *2019-2020 Implementation Plan for National Carbon Emissions Trading Total Allowances Setting and Allocation (Power Generation Industry)* was issued.

December: The *Measures for the Administration of National Carbon Emissions Trading (Trial)* was issued.

FIGURE 2
Main Activities in the National ETS in Each Compliance Cycle (Power Generation Sector)

*In the first three compliance cycles, the deadline referred to the date by which the provincial departments of ecology and environment were required to submit data to the national carbon emissions registry. In the fourth compliance period, the deadline referred to the date by which the provincial departments of ecology and environment were required to pre-allocate allowances to the key emitting entities in the power generation sector.

FIGURE 3
Allowance price since the launch of the National ETS[15]

The National ETS has also effectively facilitated emission reduction efforts in covered sectors. In 2023, China's thermal power generation sector achieved a 2.38% reduction in carbon emission intensity generation (CO_2 emissions per unit of electricity generated by thermal power generation) compared with 2018.[16] Furthermore, over 80% of key emitting entities set a designated person for their corporate carbon management, and about 15% established a carbon asset management team of more than 10 people to handle activities related to the National ETS. About 45% of key emitting entities plan to invest their revenue from National ETS into energy conservation and emission reduction initiatives.[16]

In May 2025, the *Opinions on Promoting Green and Low-Carbon Transformation and Strengthening the Construction of the National Emissions Trading System* was formally issued. The document outlines requirements for the National ETS to transition to an absolute cap, expand its coverage, implement allowance auctions, establish market stability mechanisms, build and promote the voluntary carbon market, and increase market liquidity. This document charts a clear course for the development and refinement of China's National ETS between 2025 and 2030.

Chapter 2

Features of China's National Carbon Emission Trading System

China's National ETS operates within a legislative framework that outlines its key policy components, including coverage, total allowances distributed, allowance allocation, monitoring, reporting and verification (MRV), compliance mechanisms, trading regulation, and market supervision. Table 1 outlines the design of the national carbon market. This chapter offers an in-depth examination of the National ETS design, exploring each component in detail. Furthermore, this chapter illustrates the rationale behind these design choices, and provides insight into the system's structure and operational principles.

TABLE 1
Key design elements of National Emission Trading System

KEY ELEMENTS	DETAILS
Legal system	• The legal foundation for the National ETS is *the Interim Regulations for the Management of Carbon Emission Trading* (hereinafter referred to as the State Council Regulation) released by China's State Council, effective on May 1, 2024. • The Ministry of Ecology and Environment (MEE), as the competent authority of the National ETS, issued the *Measures for the Administration of Carbon Emissions Trading (Trial)* (hereinafter referred to as the National Measures), as well as a series of specific management rules, and technical guidelines, to set the detailed rules for the National ETS. Before the State Council Regulation came into effect, the National Measures served as the legal foundation for implementing the National ETS.
Coverage	• Sectoral coverage: Power generation, iron and steel, cement, aluminum smelter. • GHGs covered: CO_2 for all covered sectors, CF_4 and C_2F_6 for aluminum smelter sector. • Type of entities: The key emitting entities are enterprises.[17] However, the boundary for MRV and allowance allocation are the facilities or installations defined within the enterprises. • Emissions covered: During the first two compliance cycles, direct emissions from fuel use and indirect emissions from the consumption of purchased electricity by power generation facilities. Indirect emissions were excluded from 2023. • Thresholds: Entities with annual emissions exceeding 26,000 tCO_2 (based on the latest verification results, or the estimation of the direct emissions in the previous year if they are newly put into production). • Number of entities: 2,162 entities in the first compliance cycle, 2,257 in the second compliance cycle, and 2,096 in the third compliance cycle. After the expansion of the iron and steel, cement, and aluminum smelter sectors in the fourth compliance cycle, approximately 1,500 key emitting entities will be added, bringing the total number to around 3,600.

KEY ELEMENTS	DETAILS
Allocation	• Allowances are allocated for free. • For the power generation sector, output-based benchmarked allocation is used with four sets of distinct benchmarks: conventional coal-fired power plants of or below 300 MW, conventional coal-fired power plants above 300 MW, unconventional coal-fired power plants, and gas-fired plants. • For the power generation sector, annual allowances are distributed in advance using a pre-allocation method, followed by an ex-post adjustment to reflect the actual production corresponding to the covered emissions. The pre-allocated allowance equals 70% of the verified emissions from the previous year. • For the iron and steel, cement, and aluminum smelter sectors, key emitting entities will receive free allowances equal to their verified emissions in the compliance year of 2024. For the compliance years of 2025 and 2026, the allocation method will be output-based and intensity-controlled. The overall allowance balance for the sectors would be roughly neutral. The detailed allowances allocations plan will be released later.
Total number of allowances distributed annually	• China's National ETS does not have an absolute emissions cap. The intensity-based total allowances can be calculated following a bottom-up approach, which means the total number of allowances can be determined ex-post by aggregating the allowances allocated to all key emitting entities according to their sectoral intensity-based benchmarks. • Around 4.5 billion tonnes per year in the first compliance cycle, 5.1 billion tonnes per year in the second compliance cycle, and 5.2 billion tonnes in the compliance year of 2024.
Monitoring, reporting, and verification (MRV)	• In addition to the four sectors with compliance obligations—power, iron and steel, cement, and aluminum smelter—companies in the chemical, petrochemical, copper smelting, flat glass, paper, and domestic aviation sectors with annual GHG emissions reaching 26,000 tonnes of CO_2 are also required to conduct MRV of their greenhouse gas emissions. • Key emitting entities are required to develop data quality control plans (monitor plans) to measure greenhouse gas emissions. The plan must be prepared in accordance with the requirements for data measurement and acquisition and implemented to carry out GHG measurement activities. • Key emitting entities in the power generation sector must submit their GHG emission reports for the previous year by March 31 each year. The verification must be finished by June 30 each year. • Key emitting entities in the iron and steel, cement and aluminum smelter sectors must submit their GHG emission reports for the previous year by June 30 in 2025. The verification must be finished by August 31, 2025. • Other entities in other key emitting sectors with only MRV obligations must submit their GHG emission reports for the previous year by March 31 each year. The verification must be finished by December 31 each year. • Provincial-level departments of ecology and environment are responsible for organizing third-party verifiers for verification of GHG emission reports submitted by the key emitting entities. This includes selecting third-party verification agencies within the province, covering verification costs, inspecting the quality of the verification process, and penalizing any violations.
Offsets	• Key emitting entities may use CCERs from projects not covered in the National ETS to offset their allowance obligations. The offset ratio must not exceed 5% of their allowances that should be surrendered.
Trading	• Only key emitting entities are allowed to trade China Carbon Emission Allowances (CEAs). • Spot market, no other derivatives. • Over the Counter (OTC) trading is not allowed. Allowances can be traded on the exchange through three methods: listed trading, block trading and bidding. • The price of listed trading shall remain between ±10% of the previous trading days closing price. • The price of block trading shall be within ±30% of the previous trading days closing price, with a minimum trading volume of 100,000 tonne CO_2e.

KEY ELEMENTS	DETAILS
Compliance and Oversight	The first compliance cycle covers emissions of 2019–2020, and the second compliance cycle covers emissions of 2021–2022, where key emitting entities surrendered allowances by the end of 2021 and 2023 respectively. Starting from the compliance year of 2023, key emitting entities are required to surrender allowances in the following year for the current year's emissions, which changes the frequency of surrendering from every two years to every year. During the compliance periods for 2023 and 2024: • For gas-fired power plants, additional allowances will be allocated to make up for the differences if the amount calculated by the allowance allocation formula falls short of actual emissions. This measure ensures that gas-fired power plants do not need to purchase additional allowances and promotes the use of natural gas as a lower carbon-intensity energy source compared to coal. • For coal-fired power plants, the allowance shortfall is capped at 20%. If their free allowances cover less than 80% of their verified emissions, their allocation will be adjusted upwards to 80% of their verified emissions. • Borrowing is not allowed except for the compliance period of 2021–2022. During the compliance period of 2021–2022, key emitting entities were allowed to borrow allowances from 2023 to a limited extent for compliance as a special support measure during the COVID-19 pandemic. The borrowing amount was capped at no more than 50% of the allowance shortfall for the respective compliance year. • Restrictions on the banking of surplus allowances were introduced starting in the compliance year of 2023. The maximum number of bankable allowances is equal to 10,000 tonnes plus 1.5 times the sum of their net sales of allowances from 2019 to 2024. • If key emitting entities fail to surrender allowances accordingly, the competent departments of ecology and environment shall mandate the entity to make corrections and impose a fine ranging from five to ten times the market value of the missing allowances, based on the average price in the month before the compliance deadline. Should the entity refuse to make the necessary corrections, its emission allowances for the following year shall be reduced by an amount equivalent to the unsurrendered emission allowances, and it may be ordered to suspend production for rectification.

2.1. Institutional Framework for the National Carbon Emission Trading System

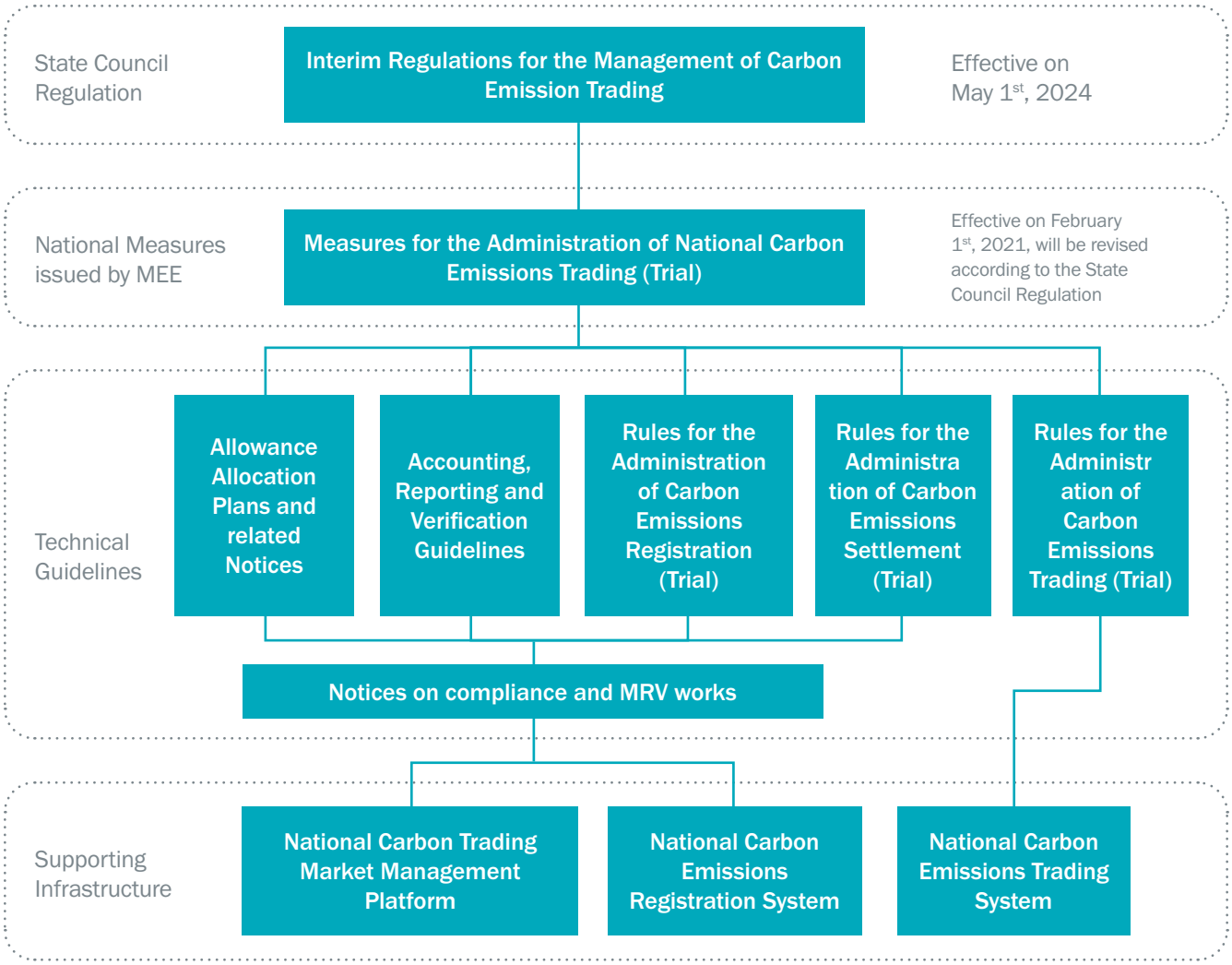
At the beginning of the National ETS, the legal foundation was the *Measures for the Administration of Carbon Emissions Trading (Trial)* (the National Measures), approved by the MEE in December 2020. It specifies the key elements and requirements for market operation and regulates national carbon emission trading and related activities.

In February 2024, the *Interim Regulations for the Management of Carbon Emissions Trading* (the State Council Regulation) was released, which came into effect on May 1, 2024. The State Council Regulation has replaced the National Measures as the highest level of regulation to manage the National ETS, signaling an elevated regulatory status of the National ETS.

The State Council Regulation designates the MEE as the competent department with the responsibility for coordinating other ministries in market oversight. At the same time, the State Council Regulation defines the rights and obligations of stakeholders, as well as regulatory and penalty measures. The current National Measures will be revised along with supporting policies based on the newly published State Council Regulation.

Jointly with other departments and stakeholders, the MEE also issues management rules for registration, trading, and settlement, as well as allocation plans and technical guidelines, which set requirements and specifications for the related work. Figure 4 shows the current institutional framework of the National ETS.

FIGURE 4
Current institutional framework of the National Emission Trading System



2.2. Key Policy Design for the National Carbon Emission Trading System

2.2.1. Coverage

To ensure smooth initial operation and reduce management costs, the National ETS intends to cover sectors with large emissions and concrete data foundations (See Deep Dive 1). In March 2024, the government work report listed sector expansion of the National ETS as one of the Chinese government's priorities in 2024. The National ETS will gradually cover additional sectors once they are ready. Seven major emission-intensive sectors are scheduled for phased coverage: petrochemicals, chemicals, building materials, iron and steel, nonferrous metals, paper making, and civil aviation.

The National ETS initially covered the fossil fuel-based power generation sector, which includes combined heat and power plants as well as captive power plants associated with other sectors, for compliance. As the *Work Plan of China's National ETS Covering Cement, Iron and Steel and Aluminum Smelter Sectors* (Sector Expansion Plan) was published in March 2025, the National ETS has officially expanded. The first compliance year for cement, iron and steel, and aluminum smelter sectors is 2024, and the first allowance surrendering would be completed by the end of 2025.

DEEP DIVE 1
Coverage determination and expansion in China

- **Covered Gases:** CO_2 is China's primary GHG emission, accounting for 90% of China's energy and industrial processes emissions in 2018.[18] The National ETS initially focuses on CO_2 due to its simpler monitoring and verification compared to other GHGs for ensuring data quality. Industrial enterprises are required to report data on other GHG emissions. In Sector Expansion plan, the MEE stated that the National ETS will cover carbon dioxide (CO_2), tetrafluoromethane (CF_4), and hexafluoroethane (C_2F_6) in the aluminum smelter sector. This marks the first time the National ETS regulates non-carbon dioxide gases.

- **Threshold:** China's energy management system usually uses an annual energy consumption threshold of 10,000 tonnes of standard coal to classify key energy-consuming enterprises. Industry enterprises with energy consumption exceeding this threshold were listed as key high-energy-consuming enterprises. For example, this standard was applied in the NRDC's 2011 *Implementation Plan for Energy Saving and Low-Carbon Action of Ten Thousand Enterprises*.[19] Based on China's energy consumption structure during the National ETS policy design phase, this energy threshold was calculated to be equivalent to approximately 26,000 tonnes of CO_2 in 2017. This became the threshold of key emitting entities for the National ETS since the release of *the Work Plan for the Construction of the National Carbon Emission Trading Market (Power Generation Sector)* in 2017.[20]

- **Indirect Emissions:** The price of China's electricity and heat remains highly regulated, restricting producers from fully passing down the cost of carbon to consumers. As a result, the National ETS covered key emitting entities' indirect emissions from purchased electricity in the first and second compliance cycles. When the National ETS expands to other industrial sectors, this design will incentivize energy efficiency improvements for the industrial sectors. Considering the alignment with the practices in other ETSs internationally, in the latest 2023-2024 allocation plan for the power generation sector, indirect emissions in the power generation sector are excluded from National ETS. In the Sector Expansion plan, the three newly-covered sectors would not cover indirect emissions.

- **Why the Power Generation Sector first?**

  First, the power generation sector emits high overall emissions and significant emissions from individual sources with relatively low administration costs. The emissions from the power generation sector account for over 40% of China's CO_2 emissions, and individual entities in this sector typically emit millions of tonnes annually. The administration and transaction costs per tonne of carbon emission are relatively low.

  Second, the power generation sector benefits from reliable data quality. Compared to other industrial sectors, the power generation sector has long been subject to stricter energy management regulations and has already established comprehensive energy consumption data statistics systems. This provides a solid data foundation and personnel capacity. Consequently, the power generation sector incurs lower additional costs for establishing an MRV system while maintaining higher data quality.

  Third, the comparability of power generation sectors primary products facilitates benchmark design. Electricity and heat, being the main output of the power generation sector, are highly comparable across entities. This comparability, combined with the sectors superior data quality, makes the power generation sector naturally suitable for designing benchmarks for allowance allocation.

  Fourth, the power generation sector is well-equipped to participate in ETS. China's power generation sector is dominated by power groups, most of which have participated in emission trading since the Clean Development Mechanism (CDM) period, beginning in 2005. These companies possess a deeper understanding of carbon markets, rich practical experience in emissions trading, and sufficient resources for carbon management.

DEEP DIVE 1
Coverage determination and expansion in China (cont.)

Meanwhile, as most of the power companies are state-owned enterprises (SOEs), they have the motivation to participate in the National ETS.

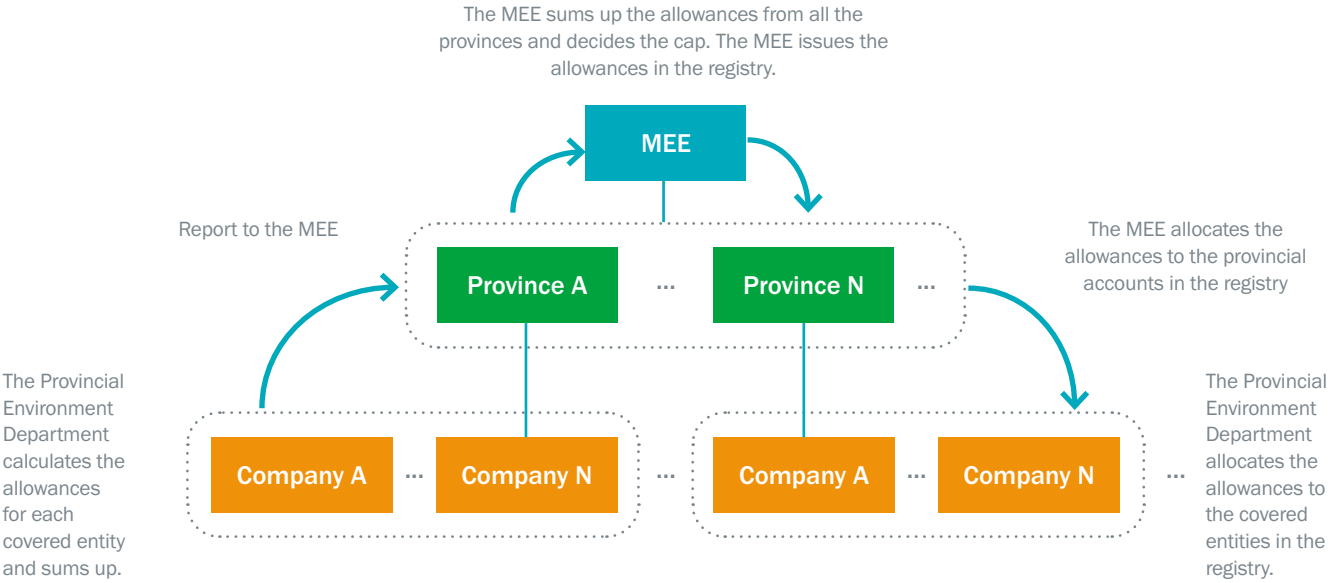
- **Sector Expansion:** Covering industrial sectors in the National ETS has been considered since the start of designing the National ETS. Since 2015, the competent authority has collected carbon emission data from the power generation sector and the seven major emission-intensive industrial sectors since 2013. Unlike the power generation sector, other industrial sectors have less experience of managing GHG emissions with limited capacity in the areas, making it difficult to provide accurate emission data.

The State Council Regulation released in 2024 offers substantial legal support for the National ETS. Building on the experience from the power generation sector, the requirements for emission reporting and verification for the industrial sectors are being developed and released on an ongoing basis. In March 2025, the Sector Expansion Plan was published, which stated that the National ETS would cover the cement, iron and steel, and aluminum smelter sectors. In September 2024 and January 2025, the MEE released the accounting and reporting guidelines and the verification guidelines for the three sectors.

2.2.2. Cap Setting

China's National ETS does not operate under an absolute emissions cap. An intensity-based total allowances can be calculated follows a bottom-up approach, which means the total number of allowances can be determined ex-post by aggregating the allowances allocated to all key emitting entities according to their sectoral intensity-based benchmarks. As the allowances are allocated based on sectoral intensity benchmarks and the key emitting entities output, the total allowances are fluctuated in accordance with the actual production levels.

TABLE 2
Benchmark value for power generation sector



The provincial departments of ecology and environment are responsible for calculating the allowances for each key emitting entity in their jurisdiction, based on sectoral intensity-based benchmark value and the actual output, and determining the allowances for allocation. The sum of these allowances constitutes the province's total allowances. At the national level, the allowances from all provinces are aggregated to calculate overall amount of allowances for the National ETS.

The total number of allowances distributed annually for the National ETS in the first compliance cycle (2019–2020) was around 4.5 billion tonnes,[21] around 5.1 billion tonnes in the second compliance cycle (2021–2022),[22] and around 5.2 billion tonnes for the compliance year of 2023.[23] After the National ETS expands to the steel, cement, and aluminum smelter sectors, the compliance year of 2024 will cover approximately 8 billion tonnes of CO_2e.

DEEP DIVE 2
The reason for the intensity-based approach

There are two major cap setting approaches in ETS design. Option 1 is setting an absolute limit on allowances based on the climate target. Under this model, the government establishes an absolute cap based on three key factors: overall emission reduction targets, an assessment of mitigation potential and costs across covered sectors, and a desired range of carbon prices. For a given set of sources and gases covered, this type of cap usually decreases over time as targets become more stringent and mitigation potential grows. Option 1 is directly linked to the climate target. It was widely adopted by majority of operated ETSs such as the EU ETS, the Korea ETS, the California Cap-and-Trade Program, and the Regional Greenhouse Gas Initiative (RGGI).[24]

Option 2 is an intensity-based approach. In this approach, the government sets the cap by assessing two key elements: desired carbon emissions intensity targets for products from the covered sectors and the actual aggregate production levels across covered entities. This approach results in a flexible cap that can increase if the covered entities produce more. Over time, the flexible cap may rise or fall depending on changes in both the desired intensity targets and output levels. Among major economies, China's regional pilot ETSs were early adopters of intensity-based control methods (beginning 2013). This approach has emerged as a new trend in global carbon markets in the Paris Agreement period, such as in the Indonesian carbon market and the British Columbia carbon market.

Based on the pilot experience, China chose an intensity-based approach in the National ETS for the following reasons.[25]

1. China's emissions trajectory remains uncertain, with peak levels yet to be reached.

As a developing country undergoing rapid economic growth and urbanization, China faces considerable challenges in accurately forecasting its carbon emissions. The sheer scale of its emissions, coupled with substantial regional disparities, further complicates GHG emissions forecasts. Instead of focusing on total emission, China decided to control the emission intensity. For China's NDCs, by 2030, China aims to lower CO_2 emissions per unit of GDP by 60–65% from the 2005 level. The intensity-based approach aligns with China's NDCs.[26]

2. Regulated power markets limit the flexibility of market mechanisms.

China's power generation sector is strictly regulated regarding power generation and pricing. Despite ongoing reform efforts, a fully liberated power market has yet to be achieved. In order to maintain market stability and ensure electricity supply, local governments may require power companies to remain in operation even under unprofitable conditions. The intensity-based approach allows key emitting entities to collectively reduce their carbon emission intensity without restricting their total electricity output levels. In this context, opting for carbon emission intensity control rather than an absolute cap control is more

DEEP DIVE 2
The reason for the intensity-based approach (cont.)

practical for designing the National ETS policy. By regulating carbon emissions per unit of output rather than total emissions, this method allows a more stable market environment under the current situation in China, fostering a more predictable relationship between allowance supply and demand.

As China approaches peak carbon emissions, China is actively preparing for the transition to an absolute emissions cap. In December 2021, the Central Economic Work Conference of CPC and the State Council proposed, for the first time, "creating conditions for an early transition from controlling energy consumption and intensity to controlling total carbon emissions and carbon emission intensity." In August 2024, the State Council released the *Work Plan for Accelerating the Establishment of a Dual Control System for Carbon Emissions*. This plan outlines that between 2026 and 2030, a dual emission control system—focused primarily on carbon emission intensity control, with supplementary total emission control—will be implemented. Post-2030, after reaching peak carbon emissions, the focus will shift to a system where total emission control will be emphasized, and carbon emission intensity control is supplementary. The plan explicitly states that carbon emission indicators will be included in future national development planning, laying the groundwork for creating an absolute cap for the National ETS in the future.

2.2.3. Allowance Allocation

In the National ETS, all China's Carbon Emission Allowances (CEAs) are currently allocated for free. The State Council Regulation indicates that paid allocation will be gradually introduced, though a specific timeline has not been established. Currently, the allocation plans were published after the corresponding compliance year, or nearly the end of the corresponding compliance year. This makes key emitting entities unable to plan emissions reductions and trade in advance.

Two-Step allocation approach

Output-based benchmark allocation is used for free allowances allocation in the power generation sector in the National ETS. Each key emitting entity receives allowances based on the pre-determined benchmark, which is then multiplied by their actual output level. Since the allocation is determined by the actual output of the compliance year, the final number can only be calculated in the following year after verification. This could potentially lead to a compressed time window for trading, giving key emitting entities little time to trade and fulfill their obligations. To address this issue, the National ETS introduced a two-step allocation approach.

The first step is the pre-allocation of allowances. Each key emitting entity receives an initial distribution of allowances based on their verified historical emission from the previous year. To avoid the risk of allocating excessive allowances, 70% of the historical emissions are pre-allocated. For example, the pre-allocated allowances for 2024 were 70% of verified emissions in 2023. These allowances were distributed to key emitting entities accounts in the registration system before the verification of its 2024 emissions and production data.

The second step is the ex-post adjustment. Once the verified actual output level data becomes available, the provincial-level departments of ecology and environment calculate the final number of allowances each key emitting entity is entitled to. The provincial-level departments of ecology and environment will recall the excessive allowances that are pre-allocated to the key emitting entities and allocate additional allowances to key emitting entities if there is a shortfall.

Benchmark setting for allowance allocation

Based on historical emission data, industry research and consultation with major power groups and industry associations, the National ETS has established different carbon emission benchmarks for four categories of power plants. In the allowance allocation plans for the power generation sector, the National ETS set four sets of benchmarks: conventional coal-fired power plants of and

below 300 megawatts (MW), conventional coal-fired power plants above 300 MW, unconventional coal-fired power plants using gangue, coal slurry, and coal water slurry as fuels, and gas-fired power plants. The four benchmarks were set after consultation with the major power groups and industry association.

In 2019 and 2020, many power generation companies opted to measure specific emissions factors, such as low-level calorific value and carbon content of coal, in the laboratory setting rather than relying on the default values previously used to calculate their emissions. As the default values are usually higher than reality, this practice significantly reduced the reported emissions for some companies and led to the overall allowance allocation being higher than intended.

To address this problem, balance values were introduced as a reference for designing the benchmark value. The balance value represents the theoretical value at which the total allocated allowances for generators power and heat generation would equal the total allowances that should be surrendered. Balance values were first calculated in the Allocation Plan for 2021–2022, which is based on verified 2021 emissions, power supply, and heat supply. In the allocation plan, benchmark values were set slightly lower than the balance values, which limits the shortage of allowance. This setting aims to incentivize decarbonization without overloading companies with compliance obligations. The balance values continued to be adopted in the allowance allocation plan for 2023 and 2024.

In addition to the actual output and benchmark values for calculating allowances, the allowances allocation plan also incorporates several adjustment factors. For example, supplementary allowances will be provided if the load of coal-fired power plants is below 65%.

Allocation Approach for Three New Sectors

According to the Sector Expansion Plan, the period from 2024 to 2026 is the initial implementation phase for carbon management in the three sectors. The policy objectives during this phase are to strengthen the foundation for carbon emissions management, help key emitting entities become familiar with market rules, improve market supervision, and enhance the

FIGURE 5
Bottom-up approaches in the National ETS

POWER PLANT TYPE	BENCHMARK FOR ELECTRICITY GENERATION (tCO_2 per MWh)			BENCHMARK FOR HEAT PRODUCTION (tCO_2 per GJ)		
	BALANCE VALUE 2023	2023	2024	BALANCE VALUE 2023	2023	2024
		VALUE	VALUE		VALUE	VALUE
Conventional coal-fired power plants above 300 MW	0.7982	0.7950	0.7910	0.1041	0.1038	0.1033
Conventional coal-fired power plants of and below 300 MW	0.8155	0.8090	0.8049	0.1041	0.1038	0.1033
Unconventional coal-fired power plants	0.8352	0.8285	0.8244	0.1041	0.1038	0.1033
Gas-fired power plants	0.3239	0.3305	0.3288	0.0525	0.0536	0.0533

participation capacity and management levels of all stakeholders. Under this guiding principle, the allocation of allowances to key emitting entities will be relatively lenient. For the compliance year of 2024, enterprises will receive free allowances equal to their verified actual carbon emissions. From the compliance years of 2025 to 2026, allowances will be allocated based on an intensity-based approach, where the number of allowances allocated to enterprises will be linked to their production capacity and output. The overall allowance balance for the sectors will remain roughly neutral.

Beginning in the compliance year of 2027, the management for the three sectors will enter a phase of deepening and refinement. By then, the policy and regulatory framework will be more comprehensive, the supervision and management mechanisms will be more robust, and all stakeholders' ability to participate in the market will be fully enhanced. With more accurate and reliable carbon emissions data, the allowance allocation methods will become more scientific and precise. A clear, transparent, and predictable mechanism for gradually tightening the total allowance cap will be established.

DEEP DIVE 3
Designing the allocation method for the power generation sector

- **Output-Based Method.** Under the free allocation methods based on historical emissions or historical output, key emitting entities receive a fixed number of allowances. Since power trading is not yet 100% market-based, power generation companies may lack the flexibility to respond purely to price signals and pass these through to consumers. Therefore, a fixed level of free allocation would penalize companies that are required to generate more. These companies would have to prepare additional allowances for incremental production, incurring costs that cannot be passed to consumers. These kinds of penalties would not help improve electricity use efficiency either. If power generation companies were able to pass on the ETS costs in electricity prices, while other energy sources are not covered by the ETS, higher electricity costs could hinder electrification.

  As above, output-based allocation causes few or no additional inefficiencies in electricity production. Power plants with carbon emission intensity below the applicable benchmark values will have an incentive to produce more if they can sell it, and the opposite will apply for those with higher carbon emission intensity. This design has a positive impact on reducing the carbon intensity of the same type of power plants (for example, among unconventional coal-fired power plants). But it is not conducive to the elimination of small and special power plants, which have higher emission intensity overall.

- **Free Allowance vs Auction.** Introducing auctions in this situation would increase the burden on power generation companies and would fail to guide changes on the consumer side. Even if prices can be passed through, the introduction of an auction will lead to increased electricity costs, resulting in higher living expenses for residents and reduced competitiveness for businesses. In that case, it would be necessary to establish a comprehensive set of support measures, including auction proceeds management mechanism, to mitigate these negative impacts.[27] Therefore, the National ETS adopts a free allocation method to ensure a smooth start. Given that power generation companies can already implement floating electricity prices within a certain range, a possible approach for introducing auctioning is to introduce a lower proportion of auctions initially, and gradually reduce the number of free allowances.[28]

2.2.4. Monitoring, Reporting, and Verification (MRV)

The National ETS acquires emission data by calculation-based methodologies. This approach quantifies CO_2 emissions by multiplying activity data by emission factors or by calculating the carbon mass balance in the production process.

The key entities in eight sectors, including power, petrochemicals, chemicals, building materials, iron and steel, nonferrous metals, paper making, and civil aviation, were required to report their annual emissions since 2013. All emission reports were verified by third-party verifiers. These data support policymakers in designing the National ETS. During this period, the accounting and reporting guidelines focus on enterprise-level emissions data, with a supplementary table for collecting facility-level emissions data.

After the launch of the National ETS, the accounting and reporting guidelines for various sectors have been updated. The MRV obligation of the power generation sector has shifted from the enterprise level to the facility level. The guidelines for other sectors also focus more on data at the facility or process level.

MRV requirement for key emitting entities

In December 2022, *Guidelines for Enterprise Greenhouse Gas Emission Accounting and Reporting for the Power Generation Facilities and Guidelines for Enterprise Greenhouse Gas Emission Verification for the Power Generation Facilities* were released. In February 2023, *Notice on Strengthening Management of Enterprise Greenhouse Gas Emission Reporting in the Power Generation Sector* was released.

In September 2024, *Guidelines for Enterprise Greenhouse Gas Emission Accounting and Reporting for the Cement Sector, Guidelines for Enterprise Greenhouse Gas Emission Verification for the Cement Sector, Guidelines for Enterprise Greenhouse Gas Emission Accounting and Reporting for the Aluminum Smelter Sector, and Guidelines for Enterprise Greenhouse Gas Emission Verification for the Aluminum Smelter Sector*, were released.

In January 2025, *Guidelines for Enterprise Greenhouse Gas Emission Accounting and Reporting for the Iron and Steel Sector, and Guidelines for Enterprise Greenhouse Gas Emission Verification for the Iron and Steel Sector* were released.

These documents established the current MRV technical requirement for the power generation, iron and steel, cement, and aluminum smelter sectors.

In the National ETS, key emitting entities are required to set up monitoring plans for emissions data quality control and monitor emissions based on their plans. They need to submit a monthly emission report within 40 calendar days after the end of each month, including fuel consumption, low-level calorific value, carbon content of the fuel, purchased electricity, output products, as well as other parameters.

An annual work plan of the National ETS is published every year, specifying the timelines for MRV activities for the year. Below is the schedule for the 2025 MRV activities.

Key emitting entities in power generation sector are required to submit their annual GHG emissions reports for the previous year by March 31. Key emitting entities in steel, cement and aluminum smelter sectors are required to submit their annual GHG emissions reports for the previous year by June 30.

Provincial-level departments of ecology and environment are responsible for organizing the verification of annual emission reports within their jurisdiction. They may commission third-party verifiers to conduct verification. Annual emission verification of the key emitting entities in power generation sector must be completed by June 30. Annual emission verification of the key emitting entities in steel, cement and aluminum smelter sectors must be completed by August 31.

MRV requirement for entities from key emitting sectors with no compliance obligations

In October 2023, the *Notice on Key Industrial Enterprises Greenhouse Gas Emissions Reporting and Verification for 2023-2025* was released, which sets the current MRV requirement for entities from the industrial and aviation sectors with no compliance obligation.

The key industrial sectors are petrochemicals, chemicals, plate glass, copper smelter, paper making, and civil aviation. Entities within these sectors are required to conduct MRV if they emit more than 26,000 tonnes CO_2e annually.

These entities are required to set up monitoring plans and monitor emissions based on their plans. They must submit their previous years emissions reports by the end of March annually.

Provincial-level departments of ecology and environment are responsible for organizing the verification of emission reports. They may commission third-party verifiers to provide verification services. Verification costs are covered by governments to ensure the independence of third-party verifiers. Verification of emissions from entities in key emitting sectors with no compliance obligation should be completed by December 31 each year.

Meanwhile, several pilots are set up to assess the feasibility of using the Continuous Emissions Monitoring System (CEMS). CEMS equipment has been installed at 152 spots in 72 enterprises as of March 2024. Research is being carried out on equipment selection, monitoring spot selection, comparison and analysis of accounting and monitoring data, and evaluation of automatic monitoring results.

DEEP DIVE 4
Improving the MRV system

The quality of emissions data serves as a critical foundation for the National ETS, functioning as the cornerstone in maintaining market credibility.

China's MRV work faced the following challenges. First, due to differences in economic development levels and production processes across various regions in China, the initial MRV guidelines struggled to accommodate the diverse circumstances of different regions. Second, the lack of experience of technical managers in key emitting entities and verifiers makes it difficult to ensure a unified understanding and implementation of MRV guidelines; and third, before 2024, penalties for violations were low and lacked sufficient deterrence.[29]

To solve these challenges the MRV system was improved from MRV guidelines, supervision, legal and capacity building aspects.

The MRV guidelines were updated and key emitting entities are required to submit monthly emission reports. Drawing from the MRV experience from 2015–2021, the MRV guidelines for the power generation sector were updated continuously in 2022, providing more detailed requirements at the facility level. Moreover, key emitting entities are required to submit a monthly emission report and supporting documents within 40 calendar days after the end of each month since 2022. These materials also need to be reviewed at the national, provincial and municipal levels under the three-tier joint review system. The National ETS has established a long-term mechanism for data quality management through normalized daily supervision and management.[30]

On the legislation front, the State Council Regulation, effective on May 1, 2024, provides strong legal support by significantly raising the penalty for data fraud. For key emitting entities, the penalties for data fraud are a minimum of CNY 500,000 (USD 70,550) and a maximum of 10 times illegal income. For technical service institutions, the penalties for data fraud are a minimum of CNY 20,000 (USD 2,822) and a maximum of 10 times illegal income. The directly responsible personnel involved in these cases would face penalties and disbarment.

The capabilities of provincial ecological and environmental departments, key emitting entities, and verification agencies have also been strengthened through various capacity-building activities. These activities include organizing national- and provincial-level training sessions, producing online courses, and establishing an expert database to answer questions online. To enhance understanding of the MRV guidelines among key emitting entities, three rounds of supervision and assistance campaigns were organized. Experts and law enforcement specialists conducted on-site supervision of 538 key emission entities across 25 provinces and 73 cities, directly addressing carbon emission data issues. As a result of these efforts, the non-compliance issues identified by verification agencies for the 2023 emission reports decreased by approximately 35.7% compared to 2022. The rate of successful first-time rectification for non-compliance issues reached 92%, showing a significant improvement over 2022.

2.2.5. Offsetting

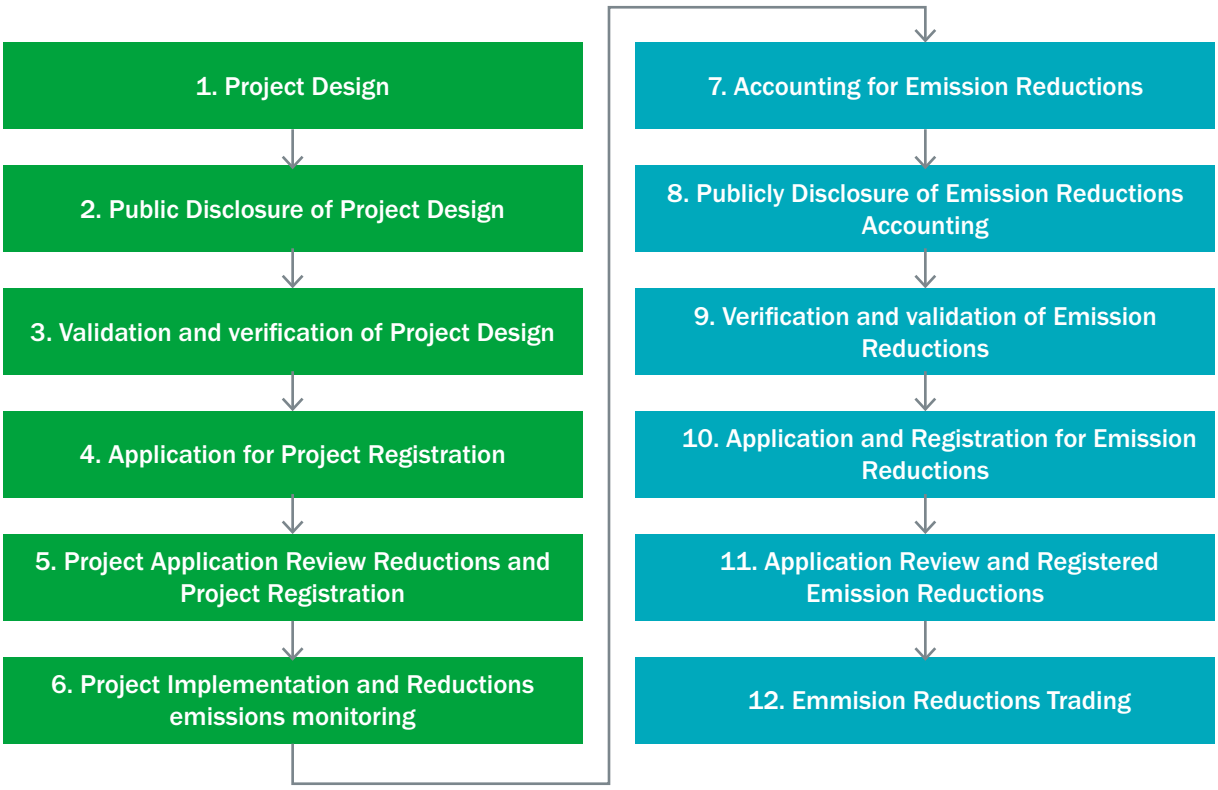
The use of offset credits is allowed in the National ETS. Key emitting entities can offset up to 5% of their allowances that should be surrendered using Chinese Certified Emission Reductions (CCERs) generated from registered projects that are not covered by the National ETS.

Development of the CCER program began in 2009 alongside the development of the regional ETS pilots. In 2012, the NDRC issued the *Interim Measures on the Management of the Greenhouse Gas Voluntary Emission Reduction Program*, which provided guidelines for the implementation of CCER program. During 2013-2016, 9 CCER exchanges were approved. The issuance of CCERs started in 2014. In 2015, the China CCER Trading Registration System was launched, marking the official operation of the CCER program. However, since the revision of the *Interim Measures on the Management of the Greenhouse Gas Voluntary Emission Reduction Program* started in 2017, the registration, approval of new CCER projects, and issuance of CCERs were suspended. In January 2024, the National Voluntary GHG Emission Reduction Trading Market, also referred as the new CCER program, was officially launched. Key elements such as project methodologies, registration agencies, validation and verification agencies, and trading institutions have been successively updated and released (see Deep Dive 5).

For the newly launched CCER program, the National Center for Climate Change Strategy and International Cooperation (NCSC) operates the CCER registry, while the Beijing Green Exchange manages the CCER trading platforms. In June 2024, the State Administration for Market Regulation (SAMR) approved the first batch of qualified validation and verification bodies to conduct the work, officially enabling CCER project development. In March 2025, the newly launched CCER program issued its first CCERs under the new methodologies, marking the substantive phase of CCER trading.

The process of CCER project registration and CCER issuance is shown in Figure 6.

FIGURE 6
Design and implementation process of the CCER program



DEEP DIVE 5
Development of the CCER program[31]

China National Voluntary GHG Emission Reduction Market (also referred to as the CCER program) provides a supplementary compliance option for the National ETS and regional ETSs. The National ETS controls carbon emissions of key emitting entities, while the CCER program encourages voluntary reduction activities in areas not covered by the National ETS, which enhances society-wide engagement in emissions reduction. The two markets operate independently but are interconnected through an offsetting mechanism for surrendering China Carbon Emission Allowances (CEAs). At the same time, the financial returns from CCER projects can also incentivize sources not covered by the National ETS to implement more ambitious mitigation actions, which can promote innovation and the adoption of low-cost mitigation technologies and minimize the overall mitigation costs in society.

In 2012, the NDRC officially issued the *Interim Measures on the Management of the Greenhouse Gas Voluntary Emission Reduction Program* and the *Guidelines on Validation and Verification of Greenhouse Gas Voluntary Emissions Reduction Projects*. In 2015, the China CCER Trading Registration System was launched, marking the official operation of the CCER program. However, the NDRC suspended the registration of new projects and the issuance of CCERs in 2017 due to low trading volume and non-compliance with the regulation in certain projects.

From 2012 to 2017, more than 1,300 projects were registered as CCER projects, covering a wide range of fields such as energy, waste disposal, agriculture, and afforestation. About 77 million tonnes CO_2e of CCERs have been issued. By the end of December 2022, the cumulative trading volume of CCERs was about 450 million tonnes, with a cumulative transaction value of about 6 billion yuan (USD 828 million). About 190 key emitting entities used about 32 million tonnes of CCERs to offset their compliance obligations during the first compliance cycle in the National ETS and 3.71 million tonnes in the second compliance cycle.

In 2018, the responsibilities for addressing climate change were transferred from the NDRC to the MEE, and the institution responsible for CCER program reform was changed accordingly. On October 19, 2023, the *Measures for the Administration of Voluntary Greenhouse Gas Emission Reduction Trading (Trial)* was issued, marking the official launch of the new CCER program. In 2020, the CCER program was approved as an eligible emission reduction program to provide Eligible Emissions Units during the pilot phase of the International Civil Aviation Organization's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). On October 24, 2023, four methodologies were published. As of June 2025, a total of six CCER methodologies have been released, including afforestation carbon sink, grid-connected solar thermal power generation, grid-connected offshore wind power generation, mangrove vegetation creation, utilization of low-concentration coalbed methane and ventilation air methane, and energy saving of highway tunnel lighting.

CCER projects and their GHG reductions must adhere to general criteria, including authenticity, additionality, uniqueness, and conservativeness. Authenticity is identified as the certified voluntary emission reductions required to be genuine, accurate, and reliable. Additionality should be reflected in voluntary emission reduction projects that help overcome barriers related to internal rate of return, financing, and critical technologies. The projects GHG emissions should be lower than the baseline emissions, or its GHG removals should be higher than the baseline removals. Uniqueness requires the projects not to participate in other GHG emission reduction trading mechanisms, avoiding project duplication or double-counting of emission reductions. Conservativeness refers to adopting conservative methods for estimation and value assessment, when precise judgments for relevant parameters or technical pathways are challenging during the accounting or verification process of voluntary GHG emission reduction projects,

DEEP DIVE 5
Development of the CCER program[31] (cont.)

to ensure that project emission reductions are not overestimated.

According to the *Notice on the Arrangement of Work Related to the National Voluntary Greenhouse Gas Emission Reduction Trading Market* published on October 25, 2023, the NCSC was assigned to serve as the registry for CCER, while the China Beijing Green Exchange was assigned to act as the exchange for CCERs. CCERs registered before March 14, 2017, can be used for offsetting in the National ETS until December 31, 2024, after which they will expire on January 1, 2025. SAMR is responsible for qualifying CCER validation and verification bodies.

As of June 2025, there are five accredited validation and verification agencies for the CCER program. Over 70 emission reduction projects have applied to become CCER projects, of which nine projects have been issued certified emission reductions with a total of 9.48 million tonnes CO_2e. The CCER trading market features a diverse participant structure, including key emitting entities and other companies, financial institutions, carbon asset management companies, and even individual participants, aiming to encourage broad societal engagement in emission reduction efforts.

Currently, only projects located in China are eligible to apply for generating CCERs. The main buyers of these credits are participants in the National ETS, regional ETSs and domestic voluntary markets. With the implementation of Article 6 of the Paris Agreement, CCER program could potentially serve as a channel for China to participate in the international carbon markets.

2.2.6. Trading

The State Council Regulations and the National Measures conclude the general provisions on trading arrangements. In May 2021, the *Rules for the Administration of Carbon Emissions Registration (Trial), Rules for the Administration of Carbon Emissions Trading (Trial),* and *Rules for the Administration of Carbon Emissions Settlement (Trial)* were issued to further clarify the rights and responsibilities of all relevant parties, such as competent departments, registry, exchange, key emitting entities, other trading participants, and so forth.

As the trading platform, the Shanghai Energy and Environment Exchange is responsible for organizing centralized and unified trading of CEAs within the National ETS. It issued the *Announcement on Issues related to National Carbon Emissions Trading*, which explains the specific trading process.

China Carbon Emissions Registration and Clearing Co., Ltd is responsible for documenting the holding, changes, surrendering, and cancellation of CEAs, and provides clearing services for the allowance trading.

Currently, only key emitting entities are permitted to create accounts in the registration system and the trading system. Other institutional and individual investors are not allowed to create accounts and trade yet. The State Council Regulation indicates that other types of institutions or individuals may eventually be allowed to participate in the market; however, there is no specific timeline or instructions have been released as of June 2025.

Since CEAs are currently allocated for free, there is no primary market. The State Council Regulation states the intention to introduce auctioning, but no specified timeline has been published yet.

In the secondary market, CEAs are traded as a spot product. Due to financial market regulations, other products (i.e., derivatives) are currently not allowed. CEAs are categorized on the exchange as four distinct products with different prices based on vintage years: CEAs for 2019 to 2020, CEAs for 2021,

CEAs for 2022 and CEAs for 2023 (See the banking requirement in 2.2.7 Compliance and Oversight).

There are three ways to trade CEAs according to the *Rules for the Administration of Carbon Emissions Trading (Trial)* (all transitions must be executed through the exchange as Over the Counter (OTC) trading is not allowed):

- Listed trading. The buyers and sellers can list their amount and price expectations in the exchange. The amount for listed trading must be less than 100,000 tonnes CO_2e.
- Block trading. The buyer and seller can agree on the amount and price within the system without listing. The minimum amount for block trading is 100,000 tonnes CO_2e.
- Bidding. The market participants can submit a selling or buying request to the exchange. Then the exchange publishes a bidding announcement to ask multiple intended counterparts to bid for the request. The transaction is completed through the trading system within the agreed time.

In 2024, 80.37% of CEAs were traded by Block Trading Contracts.[32] Due to a lack of experience in market trading, key emitting entities tend to engage in bulk agreement transactions directly with other key emitting entities. Some power generation groups also prioritise arranging bulk agreement transactions among their own power generation companies within the group.

According to the *Rules for the Administration of Carbon Emissions Trading (Trial)*, several measures such as open market operations and adjusting the use of CCERs can be adopted to conduct necessary market adjustments. In addition, the trading institution should establish risk management mechanisms, including limits on daily price variation, reporting requirements for large investors, a market risk warning system, and a reserve fund for risk. However, there are no specific instructions as of June 2025. The Shanghai Energy and Environment Exchange sets the limits on price for the market:

- The price of listed trading shall remain within ±10% of the previous trading day's closing price.
- The price of block trading shall be within ±30% of the previous trading day's closing price.

Controlling potential market risks in CEA trading is a key task of National ETS management. The State Council Regulation, which was officially enforced in May 2024, introduced the requirement for market participants. Those involved in market manipulation and disruption would face penalties up to ten times their illegal income.

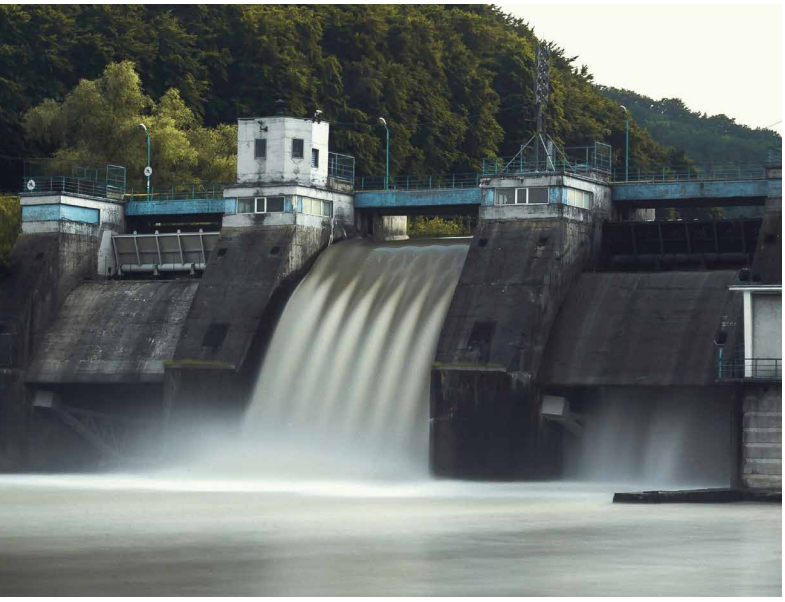
As the market mechanism matures, corporate awareness deepens, and data quality improves, more participants and products will be allowed to be included in the National ETS.

2.2.7. Compliance and Oversight

Key emitting entities must surrender one unit of allowance per tCO_2 emitted for all their covered emissions. In the first and second compliance cycles, the National Measures sets the compliance requirement for 2019–2022. The State Council Regulation significantly increase penalties and strengthen law enforcement in the National ETS. These new rules have been implemented since the surrender for the compliance year of 2023.

Each of the first two compliance cycles covered two calendar years, while the allowance surrendering from 2023 onwards takes place every year. In the first compliance cycle, key emitting entities were required to surrender allowances in 2021 for their emissions from 2019 and 2020. Similarly, in the second compliance cycle, key emitting entities surrendered allowances in 2023 for their emissions from 2021 and 2022. Starting from 2023, key emitting entities are required to surrender allowances by the end of the following year for the current year's emissions.

According to the released allocation plans, key emitting entities have limited compliance obligations. For gas-power generators, if the number of calculated allowances is less than its emissions, the actual allowances allocated would equal to its emissions, meaning there would be no need to buy additional allowances. For coal-fired power plants, if the calculated allowance is less than 80% of its emissions, the actual allowance allocated would be equal to 80% of its emissions, which means the shortfall of allowances is limited at 20%.



As a relief policy during the COVID-19 pandemic, borrowing allowances was allowed in the second compliance period (2021–2022). Enterprises with a shortfall of 10% or more could apply to borrow from a pre-approved allocation for 2023, up to 50% of the shortfall. If a key emitting entity undertaking significant public welfare protection responsibilities was unable to fulfill its compliance obligations, it could apply to borrow allowances from future compliance cycles. After the pandemic ended, the allowance borrowing policy was no longer implemented.

Banking from 2019 to 2022 was allowed without limit, but restrictions on banking were introduced starting from compliance year 2023. The maximum amount of bankable allowances for key emitting entities is calculated as 10,000 tonnes plus 1.5 times the sum of their net sales of allowances labeled in each vintage from 2019 to 2024.

In the first and second compliance cycles, the key emitting entities that failed to surrender CEAs were subject to a fine of more than 20,000 yuan (USD 2,760) but less than 30,000 yuan (USD 4,140) and had their emission allowances for the next year reduced by an amount equivalent to the unsurrendered allowances.

Starting from the compliance year of 2023, according to the State Council Regulation, if key emitting entities fail to surrender allowances accordingly, the competent departments of ecology and environment mandate the entity to make corrections and impose a fine ranging from five to ten times the market value of the missing allowances, based on the average price in the month before the compliance deadline. Should the entity refuse to make the necessary corrections, its emission allowances for the following year shall be reduced by an amount equivalent to the unsurrendered emission allowances, and it may be ordered to suspend production for rectification.

DEEP DIVE 6
Flexibilities in compliance

As mentioned in section 2.2.3, given the current regulation of the power market and concerns over energy security, the National ETS is designed to avoid imposing excessive economic burdens on power generation companies. To achieve this, the allocation plan adopts free allocation and incorporates adjustment factors. Additionally, the allocation plan includes flexibilities in compliance requirements while these measures are not permanent. Instead, flexibility rules are set in the allocation plan and compliance notice for each compliance cycle.

- **Different compliance responsibilities for coal and gas generators.** Coal-fired power generators have a maximum shortage of 20% of their verified emissions to fulfill their compliance obligation, while gas-fired power generators are not required to purchase additional allowances. This is because natural gas has a much lower carbon emission intensity compared to coal. And it also features fast start-up, flexible adjustment, and a mature industry. These features make it an excellent energy source for maintaining a stable grid with higher and higher renewable energy. At the current stage, further development of natural gas power generation plays an important role in achieving carbon peaking and carbon neutrality.
- **Banking.** Like most ETSs, banking was allowed in the National ETS. In the second compliance cycle, CEAs for 2019 and 2020, CEAs for 2021, and CEAs for 2022 are categorized based on vintage years into three different products, as listed, for trading and have similar prices. In the allocation plan for 2023 and 2024, restrictions on the banking of surplus allowances has been introduced starting in 2023. The maximum number of bankable allowances is equal to 10,000 tonnes plus 1.5 times the sum of their net sales of allowances labeled in each vintage from 2019 to 2024. In previous transactions, some key emitting entities were reluctant to sell their remaining allowances, making it difficult for others that were in demand near the deadlines of compliance to purchase allowances. By introducing the banking restriction policy, key emitting entities are encouraged to sell their remaining allowances and boost market liquidity.
- **Borrowing.** In the National ETS, the policy on borrowing has evolved. For example, borrowing was permitted in the second compliance cycle. This adjustment was primarily due to the sharp rise in coal and natural gas prices caused by the impact of the COVID-19 pandemic, which placed significant operational pressure on the power generation sector. Considering these circumstances, the National ETS introduced the allowance borrowing policy as one of its flexibility measures to avoid placing an excessive burden on the power generation industry during difficult times. After the pandemic ended, the compliance notice for 2023 eliminated the allowance borrowing policy.

2.3. Key Infrastructure for the National Carbon Emission Trading System

There are three online platforms in the National ETS for accurate and efficient data collection, transfer, and management. The three systems are responsible for MRV, allowance allocation, surrendering and settlement, and trading functions. The information center of the MEE established the national carbon trading market management platform to record emission-related data of key emitting entities. The Hubei provincial government was assigned to establish the national carbon emissions registration system, while the Shanghai municipal government was assigned to establish the national carbon emissions trading system.

2.3.1. National Carbon Trading Market Management Platform

The national carbon trading market management platform (the management platform), established and operated by the Information Center of the MEE, is responsible for serving the full process management of MRV, including carbon emission data management,

quality supervision, and verification management. This platform has set up accounts for competent departments at all levels and market participants to manage carbon emission data.

This management platform serves as the central hub for MRV management. Key emitting entities report their emissions on this platform while the verifiers submit their verification reports. The platform also includes a cross-check function that compares internal data from other key emitting entities and external data from other government departments. This real-time review and early warning for reporting contents and anomalies will improve the ability to detect risks in emission data.

Using the emission data, this platform also assists the competent departments in calculating the allowances for key emitting entities. The result of the calculation would be transferred to the registration system for CEA allocation.

2.3.2. National Carbon Emissions Registration System

The national carbon emissions registration system (the registration system), established and operated by China Carbon Emissions Registration and Clearing Co. Ltd., which is supported by the Hubei provincial government, is responsible for CEA registration and clearing. It has created accounts for the competent departments, and market participants to manage CEAs. It mainly implements three functions.

The first function is the distribution of allowances. When the MEE confirms the number of pre-allocated allowances, it will be responsible for distributing the pre-allocated number of allowances in the MEE account and allocating the corresponding allowances to the accounts of the provincial ecology and environment departments. The provincial ecological and environment department is responsible for allocating the corresponding allowances to the accounts of key emitting entities. Following the completion of emissions verification and the final determination of the actual allowances to be allocated, the same process is carried out again to reflect the adjusted, final allocation results.

The second function is the implementation of physical settlement (delivery) and financial settlement after market participants reach transaction agreement. When buyers and sellers clarify the quantity and price through the trading platform, the transaction information will be transmitted to the registration system. The registration system transfers the allowances from the seller's account to the buyer's account based on the transaction information. At the same time, it notifies the bank to transfer the corresponding amount of money from the buyer's bank account to the seller's bank account.

The third function is the surrendering of allowances for compliance. After verification, the MEE determines the allowances that each province should surrender and notifies the provincial ecology and environment departments. The provincial ecological and environment department determines the number of allowances that all key emitting entities within their jurisdiction need to surrender and informs the key emitting entities. The key emitting entities surrender the required number of allowances to the provincial accounts within the system. Each province then transfers its allowances to the MEE account. The MEE retires these allowances and confirms the completion of compliance. The registration system also connects to the CCER registration system to confirm the use of CCER in compliance.

In addition to the three core functions, the registration system also provides auxiliary functions such as key emitting entities information management, account user management, and voluntary retirement. It also provides information analysis functions to cooperate with the MEE in market supervision.

2.3.3. National Carbon Emissions Trading System

The national carbon emissions trading system (the trading system), established and operated by Shanghai Environment and Energy Exchange, which is supported by the Shanghai municipal government, is responsible for organizing centralized and unified trading of CEAs within the National ETS. After buyers and sellers clarify the quantity and price on the trading platform, it transmits the transaction information to the registration system.

As mentioned in 2.2.6, market participants can choose to conduct listed trading, block trading or participate in bidding. The trading system implements these trading methods on the online platform, providing trading channels for market participants across the country.

Chapter 3

Overview of Regional Carbon Emission Trading Systems

From 2013 to 2016, China launched eight regional ETSs in Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong, Shenzhen, and Fujian. Over years of operation, these regional markets have developed comprehensive designs, incorporating unique elements that are tailored to their specific regional contexts. The experience of regional markets shaped the policy design of the National ETS.

3.1. Development of Regional Carbon Emission Trading Systems

China's regional ETSs have adopted innovative approaches to improve their market systems based on each regions unique emission profiles and economic situations. First, the regional ETSs gradually expanded the coverage and the scope of market participants. Second, the regional ETSs also explored carbon finance services, including carbon asset custody, carbon asset pledge loans, allowance buy-back, and carbon insurance. Third, the regional ETSs explored and developed links between the citizens low-carbon daily activities and the ETSs and helped implement regional Tan Puhui projects.[33]

The regional ETSs also accelerated local low-carbon transition. For example, the carbon emission intensity of key emitting entities in Shenzhen ETS fell by 42% from 2013 to 2022, while the added value increased by 62%, achieving economic development while reducing the growth of carbon emissions.[34] The carbon emissions in the Hubei ETS in 2015, 2016, and 2017 dropped by 3.14%, 6.05%, and 2.59% year-on-year, respectively.[35] In 2023, the total carbon emissions of industrial enterprises in the Shanghai ETS decreased by approximately 14.7% compared with 2013, while the building sector saw a reduction of 12.8%.[36] In 2020, the carbon emission intensity of key emitting entities in Beijing ETS dropped by more than 23% compared with 2015, outperforming the objectives outlined in the 13th Five-Year Plan.[37] In 2020, the cumulative emission reduction in Guangdong was 59.23 million tonnes of emissions, with an emission reduction rate of 16% compared to the year they were first included in the market.[38]

3.2. Experience of Regional Carbon Emission Trading Systems

Against the backdrop of varying development stages across different regions, the practices of regional ETSs have provided valuable experience for the establishment of the National ETS, including legal framework establishment, market system design, and market supervision. The practice of regional ETSs has proven that market-based mechanisms can integrate with China's governance system and economic development to form a carbon market policy system suitable for the country's unique conditions.

Drawing from the experiences of regional ETSs, the competent departments shall establish a complete

legal system encompassing laws, administrative regulations, local regulations, and technical guidelines and instructions. The competent department should strictly enforce the law. Penalties and enforcement details for market violations are an important component of carbon market legislation.

Unlike the EU ETS and California Cap-and-Trade Program, which were built on established legal foundations, China launched its regional ETSs without preexisting climate change-related legislation. Instead, these regions initially relied on strong administrative measures to launch the carbon market, gradually introducing higher-level and more binding legislation. Strong administrative measures made up for the lack of legislation in the early stages.

The National ETS has followed a similar legislative path to the regional ETSs. Initially, the market was initially launched through ministerial-level management measures, forming comprehensive technical specifications. After two compliance cycles, the State Council released a higher-level national management decree (the State Council Regulation).

3.2.1. Establish and Improve a Robust MRV System

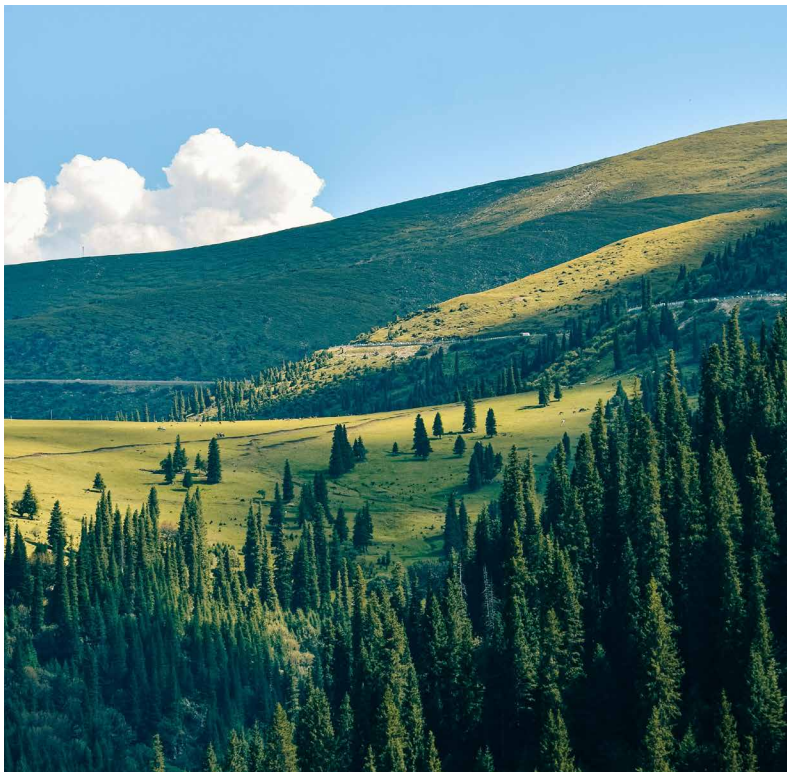
A well-managed third-party verification system is crucial for ensuring data accuracy. Each regional market has set qualification requirements for third-party verification agencies. Some have also introduced requirements for the capabilities of verifiers. Most regional ETSs used government-procured verification services to ensure the independence of third-party verifiers. Also, competent departments in regional markets evaluate verification agencies and verifiers through random inspections or by reexamining verification reports to strengthen supervision and management. Verification agencies with low accuracy would be punished or even disqualified. In the management of third-party verification agencies for the National ETS, these practices have been adopted by the competent departments at various levels.

Throughout the regional ETSs, as enterprise carbon management awareness and capabilities increased, the MRV guidelines were refined toward the facility and process levels. The competent department that is responsible for the regional ETS established communication platforms with enterprises, research institutions, industry associations and other stakeholders. They regularly collect and study feedback on the implementation of the MRV system, review operational experience, and translate these insights into policy improvements, optimizing the MRV system to adapt to corporate greenhouse gas accounting and verification requirements. The National ETS has followed a similar path. After establishing enterprise-level MRV requirements, it continues to refine reporting requirements at the facility and process levels, paving the way for setting sector-specific baselines.

3.2.2. Choose Appropriate Coverage

Although the sectors covered by regional ETSs vary, they all follow the principle of "focusing on the major emitters while overlooking the minor ones." From 2013 to 2014, the regional ETSs initially targeted energy-intensive sectors. At the same time, MRV requirements are also applied to some non-key emitting entities. As the market matures, coverage will expand to include more sectors and the coverage threshold will be lowered.

To be consistent with China's statistics system, energy conservation, taxation, and other enterprise management frameworks, the key emitting entities are



set as independent legal persons in the regional ETSs. In addition, the emission data can be cross-verified against other government records, invoices, and tax documents. Considering that the benchmarking method requires facility- or process-level emission data, some regional ETSs require key emitting entities to monitor and report their facility-level data. In this case, key emitting entities are required to compile and submit data from all their facilities in a single report.

The National ETS builds upon the design of the regional ETSs on coverage, with independent legal entities as the key emitting entities. The National ETS prioritizes the power generation sector due to the sectors emissions. While other energy-intensive sectors currently face no compliance obligations, they have MRV requirements, preparing for potential future coverage for compliance.

3.2.3. Intensity-Based Allocation Approach and Allowance Management Policies

As introduced in Deep Dive 2 and Deep Dive 3, the National ETS adopts an intensity-based benchmark to calculate the allowance distributed to key emitting entities. These methods have been adopted by regional ETSs since 2013. The carbon emissions data MRV required in local carbon emissions trading markets provides data support for developing specific industry allowance allocation plans. When updating data reporting requirements for industrial sectors in the National ETS, the allowance allocation methods and corresponding MRV requirements from the regional ETSs serve as a reference.

In addition, several regional ETSs have introduced auction to allocate allowances as well as reserved allowances for market stability. Although the National ETS has not yet adopted these practices, it has already conducted research on both auction mechanisms and market stability mechanisms based on the experiences of the regional ETSs.

The design of China's National ETS incorporates key insights from regional ETSs beyond the three major experiences previously mentioned by the regional ETSs. These additional learnings encompass offset mechanism management and trading supervision. As the National ETS evolves, it is likely to incorporate more policy designs based on the practices from the regional ETSs.

Chapter 4

Prospects for the Development of the National Carbon Emission Trading System

China has designed its ETS with flexibility tailored to the nation's characteristics while continuously exploring innovative approaches. This has been providing practical insights for the development of carbon markets in other countries and regions. As the worlds largest ETS by covered emissions, China's ongoing improvement of its National ETS can provide strong efforts in addressing climate change globally.

China's National ETS has achieved notable progress since it started trading in 2021. The adoption of China's first specialized legislation in addressing climate change cemented the legal foundation for the development of the National ETS. Moreover, expansion of the National ETS to include key industrial sectors enhances its efforts in driving low-carbon transitions across these sectors. This development has strengthened the effectiveness of the National ETS itself and further reinforces global confidence in leveraging carbon markets for addressing climate change.

China's National ETS has provided new practical experiences for carbon markets globally, particularly regarding approaches to determining allowance allocations and enhancing emissions data quality. Given that China has not yet peaked its total carbon emissions, the National ETS currently adopts an innovative intensity-based approach for allocating allowances. This approach strikes a balance between socio-economic development and provides sustained incentives for emission reductions. Additionally, emissions data from key emitting entities are recorded on a monthly basis and undergo examination at the national, provincial, and municipal levels through the three-tier joint review mechanism. This has enabled routine supervision over the emission data of key emitting entities to ensure data quality.

Looking ahead, further enhancement of the National ETS remains essential. The roles of National ETS in achieving emission reduction targets need to be clearly defined, alongside improvement in the market design, such as introduction of absolute cap and auctioning mechanisms, as well as enhanced policy coordination and expanded coverage to additional industrial sectors.

First, the medium- and long-term positioning of the National ETS within the framework of China's dual carbon goals need to be articulated. By establishing science-based cap trajectories, the role and contribution of the National ETS toward achieving China's climate goals can be further defined. This clarity will provide policy certainties, strengthen climate governance coherence, and reinforce the credibility and stability of the market.

Second, the National ETS requires continuous improvements in cap-setting, allowance allocation and sectoral coverage to further enhance its effectiveness. Specifically, it should gradually transit from intensity-based benchmarks to an absolute cap, thereby leveraging its capacity in reducing China's total carbon emission. To

enhance carbon price signals, the National ETS should gradually shift from free allocations to auctioning and tighten free allowance allocation benchmarks across sectors. Additionally, a sound proceeds management mechanism needs to be in place to fund low-carbon technologies, support a just social transition for more emission reductions. Meanwhile, expanding the National ETS coverage to additional high-emitting industrial sectors will help lower the overall societal cost associated with emission reductions and achieve more ambitious emission reductions.

Lastly, the National ETS needs to improve its supportive policies and strengthen the coordination between the National ETS and related climate policies, including addressing carbon-related legal, fiscal, and accounting issues, and enhancing coordination between carbon market and other climate policies and systems, such as carbon budget, carbon footprint, and emission limitation, to boost emission reduction synergies and incentives.

Looking ahead, further enhancement of the National ETS remains essential. The roles of National ETS in achieving emission reduction targets need to be clearly defined, alongside improvement in the market design, such as introduction of absolute cap and auctioning mechanisms, as well as enhanced policy coordination and expanded coverage to additional industrial sectors.

Chapter 5

Appendix

5.1. Major Policy Milestones of China's National Carbon Emission Trading System (2020–Present)

TIME	ISSUING DEPARTMENT	DOCUMENT
Level of Central Committee of the Communist Party of China (CPC) and State Council		
May-2025	CPC	*Opinions on Improving the Market-Based System for Environmental Resource Allocation*
May-2025	CPC and State Council	*Opinions on Promoting Green and Low-Carbon Transformation and Strengthening the Construction of the National Emissions Trading System*
Feb-2024	State Council	*Interim Regulations for the Management of Carbon Emission Trading*
Level of Competent Departments and Supporting Departments		
Dec-2020	Ministry of Ecology and Environment (MEE)	*Measures for the Administration of Carbon Emissions Trading (Trial)*
Dec-2020	the MEE	*National Carbon Emission Trading Cap Setting and Allowance Allocation Implementation Plan 2019-2020 (Power Generation Sector) and Name List of 2019-2020 Key Emitting Entities in Power Generation Sector*
Mar-2021	the MEE	*Guidelines for Enterprise Greenhouse Gas Emission Accounting Methodology and Reporting Guidelines (Power Generation Facility)*
Mar-2021	the MEE	*Guidelines for Enterprise Greenhouse Gas Report Verification (Trial)*
May-2021	the MEE	*Rules for the Administration of Carbon Emissions Registration (Trial), Rules for the Administration of Carbon Emissions Trading (Trial), and Rules for the Administration of Carbon Emissions Settlement (Trial)*
Jun-2021	Shanghai Environment and Energy Exchange (SEEE)	*Announcement on Issues related to National Carbon Emissions Trading*
Oct-2021	the MEE	*Notice on Strengthening Allowance Surrender for the First Compliance Cycle of the National Carbon Emission Trading*
Feb-2022	the MEE	*Notice on Strengthening Work After the First Compliance Cycle of the National ETS*
Mar-2022	the MEE	*Guidelines for Enterprise Greenhouse Gas Emission Accounting Methodology and Reporting guidelines (Power Generation Sector) (2022 Revised Edition)*
Jun-2022	the MEE	*Notice on Updating Key Tasks of Enterprise Greenhouse Gas Emission Reporting to Coordinate Pandemic Control and Social Economic Development*

TIME	ISSUING DEPARTMENT	DOCUMENT
Sep-2022	the MEE	National Carbon Market Q&A
Dec-2022	the MEE	*Guidelines for Enterprise Greenhouse Gas Emission Accounting and Reporting for Power Generation Facilities and Guidelines for Enterprise Greenhouse Gas Emission Verification for Power Generation Facilities*
Feb-2023	the MEE	*Notice on Strengthening Management of Enterprise Greenhouse Gas Emissions Reporting in the Power Generation Sector for 2023-2025*
Mar-2023	the MEE	*Implementation Plans on National Carbon Emission Trading Allowance Setting and Allocation in the Power Generation Sector for 2021 and 2022*
Jul-2023	the MEE	*Notice on Allowance Surrender of the National Carbon Emissions Trading Market for 2021 and 2022*
Oct-2023	the MEE	*Notice on Key Industrial Enterprises Greenhouse Gas Emissions Reporting and Verification in 2023-2025*
Sep-2024	the MEE	Issued the Enterprise Greenhouse Gas Emission Accounting and Reporting Guidelines and the Verification Guidelines for Cement and Aluminum Smelter Sectors.
Oct-2024	the MEE	*Notice on the Allowance Allocation and Surrender in the National Carbon Emissions Trading Market for the Power Generation Sector in 2023 and 2024*
Jan-2025	the MEE	Issued the Enterprise Greenhouse Gas Emission Accounting and Reporting Guidelines and the Verification Guidelines for Iron and Steel Sector.
Mar-2025	the MEE	*Work Plan of China's National ETS Covering Cement, Iron and Steel and Aluminum Smelter Sectors*
Apr-2025	the MEE	*Notice on Advancing Relevant Work for the National Carbon Emission Trading Market in 2025*

5.2. China's GHG Voluntary Emission Reduction Program (CCER Program) Fact Sheet

KEY ELEMENTS	DETAILS
Climate Goal	Contribute to the achievement of China's carbon peaking and carbon neutrality goals
Covered GHGs	Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbon (PFCs), Sulfur Hexafluoride (SF_6), Nitrogen Trifluoride (NF_3).
Regulation	*Measures for the Administration of Voluntary Greenhouse Gas Emission Reduction Trading (Trial)* (released on Oct 19, 2023)
Methodologies	*Outline of Methodology for Greenhouse Gas Voluntary Emission Reduction Program* was released on Mar 30, 2023. The first batch of project methodologies was released on Oct 24, 2023, including afforestation carbon sink, grid-connected solar thermal power generation, grid-connected offshore wind power generation, and mangrove vegetation creation. • *Project Methodology on Afforestation Carbon Sink for Voluntary Greenhouse Gas Emission Reduction (CCER-14-001-V01)* • *Project Methodology on Grid-connected Solar Thermal Power Generation for Greenhouse Gas Voluntary Emission Reduction (CCER-01-001-V01)* • *Project Methodology on Grid-connected Offshore Wind Power Generation for Greenhouse Gas Voluntary Emission Reduction (CCER-01-002-V01)*

KEY ELEMENTS	DETAILS
Methodologies	• *Project Methodology on Mangrove Vegetation Creation for Greenhouse Gas Voluntary Emission Reduction (CCER-14-002-V01)* The second batch of project methodologies was released on Jan 3, 2025, including utilization of low-concentration coalbed methane and ventilation air methane, and energy saving of highway tunnel lighting. • *Project Methodology on Utilization of Low-Concentration (Below 8%) Coalbed Methane and Ventilation Air Methane (CCER-10-001-V01)* • *Project Methodology on Energy Saving of Highway Tunnel Lighting Systems (CCER-07-001-V01)* Current effective methodologies are officially released by the MEE
Registry	The national registration institution manages the registry. Before the establishment of the national registration institution, the National Center for Climate Change Strategy and International Cooperation (NCSC) assumes the managing role.
Trading Platform	The national trading institution manages the trading system. Before the establishment of the national trading institution, the China Beijing Green Exchange assumes the managing role.
Validation and Verification Bodies	Approved jointly by the MEE and the State Administration for Market Regulation (SAMR). The first batch of accredited validation and verification bodies was released on June 11, 2024, including 5 institutions.
Penalties	Violation of the measures will be ordered for rectification, be imposed fines or sanctions. Those refuse supervision and inspection, or project owners providing falsified materials could be fined not less than 10,000 RMB but no more than 100,000 RMB; Validation and verification bodies violating the measures could be fined not less than 50,000 RMB but no more than 200,000 RMB.
Offsetting the National Carbon Market Compliance Obligation	Covered entities in the national carbon market may use China Certified Emission Reductions (CCERs) to offset up to 5% of their annual carbon emission allowances that should be surrendered. The issued emission reductions before March 14, 2017, can be used to offset annual carbon emission allowances surrendering of key emitting entities covered by the National carbon market before December 31, 2024. From January 1, 2025, issued emission reductions under the previous CCER program cannot be used for the National ETS.
Projects and Emission Reductions Registration	Project owners, and validation and verification bodies should publicly disclose relevant documents before registration, and are committed to and responsible for the authenticity and compliance.
Registered Projects	As of June 2025, 23 projects were registered.
Issued Emission Reductions	The first batch of CCERs was registered on March 6, 2025, totaling 9.48 million tonnes CO_2e.
Technical Specification	• *Guidelines for the Design and Implementation of Greenhouse Gas Voluntary Emission Reduction Projects* (released on Nov 16, 2023) • *Implementation Rules of Validation and Verification for Greenhouse Gas Voluntary Emission Reduction Projects* (released on Dec 25, 2023) • *Registration Rules for Greenhouse Gas Voluntary Emission Reduction Program* (released on Nov 16, 2023) • *Trading and Settlement Rules for Greenhouse Gas Voluntary Emission Reduction Program* (released on Nov 16, 2023)

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