Getting the Prices Right: Economy-wide Policies to Promote Structural Change: China

Case Study 5. Emissions Trading Systems in China

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As of April 1, 2022, there were 32 emissions trading systems (ETSs) in operation globally, covering nearly one-fifth of global GHG emissions. Economists point out that ETSs and carbon taxes can both achieve mitigation at least cost with a preference for one policy instrument over the other emerging when accommodating for some real-world attributes.

ETSs are premised on tradable pollution rights, also referred to as allowances or permits. In a traditional ETS, governments institute a cap on the volume of emissions for one or more sectors of the economy and distribute allowances via free allocations or auctioning. In contrast to carbon taxes, ETSs deliver greater certainty over the degree of emissions reductions, but less certainty over the carbon price. Whereas free allocation enables ETSs to achieve greater political buy-in without undermining mitigation ambition, they are relatively more complex and costly to administer than carbon tax systems. For example, ETSs generally require a more comprehensive monitoring, reporting, and verification framework; a liquid market; and a credible price signal.

This case study explores how an ETS operates, through the lens of the China National ETS. Officially launched in 2017, its first compliance period covered the years 2019 and 2020, and the first trading of allowances started in July 2021. China's ETS differs from other major "cap-and-trade" schemes, like the EU ETS, in that it caps the emissions intensity of output rather than the absolute quantity of emissions. This means that compared with a traditional cap-based approach, emissions can continue to rise with output, creating an additional challenge for emission reduction objectives. Currently, all allowances in China's ETS are allocated free to regulated entities based on technology and fuel benchmarks. Although this has been done to help address regional redistribution objectives, it likely distorts emission reduction incentives and lowers the scheme's overall cost-effectiveness. The evolving design of China's national ETS—including from an intensity-based to an absolute cap-based scheme—provides the opportunity to address and improve several design elements.

Context

China's CO_2 emissions rose to 11.9 $GtCO_2$ in 2021, amounting to about one-third of the global total (IEA 2022c; Ritchie and Roser 2020). To decarbonize, China's strategy is

premised on the dual goals of peaking emissions before 2030 and achieving carbon neutrality by 2060. These goals, reaffirmed in October 2021 as part of the 1+N policy framework, underpin China's NDC and emphasize the crucial role that China's national ETS will play in supporting their realization.

China first announced its decision to use a national ETS in 2011 and has built crucial hands-on experience through its eight regional pilots, most of which have been operational since 2013**.** China's short-term ambition for its national ETS is to help accelerate energy efficiency, with a target of reducing carbon intensity by 18 percent by 2025 compared with 2020. In the long term, the ETS (combined with renewable energy mandates) aims to support achieving carbon neutrality targets, as stipulated in China's series of five-year plans.

Like most other developing economies, China's key challenge is how to reduce emissions without hampering economic growth. One key design decision, therefore, was launching the national ETS functionally as a tradable performance standard, meaning the regulation targets intensity benchmarks, and any compliance obligations begin to surface only when exceeding those benchmarks. A second design element was to adopt an ETS for the power sector initially, before expanding it to trade-exposed sectors, several of which are still selectively regulated under the various regional pilots (Yin 2021). Third, regulators opted to initially allocate free allowances rather than auction them. Fourth, compliance for gas-fired power plants is capped to only their freely allocated allowances, while that for coal-fired power plants is capped to their free allowance allocation plus up to a 20 percent maximum of their verified emissions (ICAP 2021; Ministry of Ecology and Environment 2020). For the second compliance period (calendar years 2021 and 2022), regulated entities are permitted to borrow against their 2023 allowance budget to help offset financing hardships stemming from disruptions to global fuel supply. Intensity benchmarks have also been tightened for the second compliance cycle relative to the first (Yin 2023a).

Policy

The national ETS scheme covers coal- and gas-fired power plants that emitted more than 26 metric kilotons of carbon dioxide in any one year between 2013 and 2019. This comes to just over 2,100 power plants. These power plants are responsible for approximately 4.5 $GtCO_2$ or just over 40 percent of China's CO_2 emissions. It is projected that at full scale, the scheme will cover close to 80 percent of China's emissions and span multiple sectors, including iron and steel, chemicals, and building and materials, several of which are currently still regulated under the various regional pilots.

The Ministry of Ecology and Environment (MEE) oversees the administration and implementation of the national ETS, and in some cases, gives local government ministries the authority to supervise major emitters within their jurisdictions. Despite free allocations and limited compliance, power generators with above-average intensities

generally need to purchase allowances to be able to meet their compliance requirements. To support the development of domestic carbon offsets, ETS participants can use China's certified emissions reductions (Xue 2022), that is, emission reduction activities implemented by companies outside the ETS on a voluntary basis and the resulting emission reductions certified by the government, to meet up to 5 percent of their ETS compliance requirements.

The rollout of the national ETS and its several components continues to experience some delays. Its initial launch experienced multiple delays as the government remained concerned about several issues, including inequality impacts across provinces, downstream impacts of higher prices, and the complexity of the scheme itself (Yin 2021). Although such delays are not atypical for new policy rollouts, in China's case these were compounded by evolving administrative arrangements that included the transfer of oversight from the National Development and Reform Commission—China's main economic planning body—to the MEE; concerns about the accuracy of emission data; the unfamiliarity of establishments, especially those that had no prior ETS experience with their compliance obligations and reporting requirements; the COVID-19 (coronavirus) pandemic; and the setting up of a robust and trusted trading platform (Singh, Stanway, and Xu 2021).

Results and Impacts

The national ETS completed its first trading period in December 2021, covering the compliance years 2019 and 2020. The second compliance cycle covers emissions from 2021 and 2022, and all entities will need to surrender allowances and have their emissions validated by the end of 2023 (Yin 2023b). A total of 179 $MtCO_2$ of allowances were traded between July 14 and December 31, 2021, with prices closing that year at ¥54.2, or US$8.5, per metric ton CO_2. This represented a cumulative turnover of close to ¥7.7 billion, or US$1.3 billion (Ministry of Ecology and Environment 2022). Allowance trading was sparse, with bunching taking place toward the December 31 deadline. Compliance was reported at 99.5 percent, but issues with the accuracy of emissions data surfaced (Xu and Stanway 2022). Since January 2022, prices have been mostly stable, fluctuating between US$8–9/$MtCO_2$. While there is some oversupply of allowances, which can undermine allowance prices, authorities are yet to decide whether allowances from the first compliance cycle are bankable to the second cycle (ICAP 2023).

China aims to raise the effectiveness of its ETS through design improvements. Substantial design flexibility has enabled it to manage price volatility over the second compliance cycle. To inform these design improvements, authorities are maintaining a consultative approach where various stakeholders have windows for public review and comment on proposals. Trust and inclusivity in the government's decision-making process, combined with the inclusion of state-owned enterprises in China's national

ETS are likely to ensure that the national ETS's complete rollout continues to face little resistance. Stakeholder engagement and capacity building to better understand reporting requirements and compliance obligations, especially in regions that were not covered by regional pilots, also continue to be crucial for confidence building and will continue to be necessary as the national ETS expands.

Although it is too early to empirically assess the effectiveness of the national ETS, empirical assessment based on the regional pilots can be helpful for understanding possible impacts. These assessments, which are based on data prior to 2020, in general point toward a greater than 10 percent reduction in enterprises' emissions due to ETS operation (Cui et al. 2020; Cao et al. 2021). The reductions were achieved both through energy conservation measures and fuel-switching activity. The consequences of the Chinese power market structure—where electricity prices are regulated and power markets nonliberalized—are understood to have lowered the effectiveness of ETS operations, mainly by interfering with the capacity to fully pass-through allowance costs. This, combined with the low allowance prices that were observed in the regional pilots, has curbed the capacity for even greater emission reductions. Reported economic consequences of the regional pilots include negative impacts on employment and improvements in total factor productivity.

The current design of the national ETS potentially limits its ability to drive least-cost abatement. Technology-specific intensity benchmarks can distort incentives for emission reduction across power stations of different sizes or those using different fuels and technologies, limiting the potential for the ETS to deliver additional emissions reductions. In particular, the use of intensity benchmarks could potentially incentivize power production from more emissive units—for example, by shifting investment and power generation to less efficient smaller coal-fired generators or unconventional coal units with less stringent benchmarks (Yin 2023a). The economics is clear that a cap-based scheme is more cost-effective than an intensity-based system and the technology-fuel benchmarks distorting incentives, but an inspection of plant-level data is required to provide clarity on the empirical magnitude of the inefficiencies.

Key Takeaways

China's experience with designing and implementing an ETS, as well as the implementation experience from other jurisdictions, offers some important takeaways. Ultimately, China's nascent national ETS represents a compromise between ambition and pragmatism, recognizing the need to address many technical, regulatory, distributional, economic, and political issues in a phased manner. Design features—including the coverage and technology-specific benchmarks—have facilitated implementation and operability—but may have reduced effectiveness. The country can address these issues as it reviews and refines the ETS over time. In this regard, efforts have already been made to strengthen third-party verification, and there are now penalties for submitting

fabricated or false reports. To increase liquidity, China also intends to allow financial traders into the market.

China's experience with ETS implementation and administration has highlighted several challenges, not all unique to this market. These including enterprises' unfamiliarity with the ETS rules, concerns related to data transparency and accuracy, implementation delays, and low allowance prices and trade volumes. As China continues to learn and improve the design, implementation, and administration of its national ETS, there are several lessons that can be looked at and considered.

- Establishing and fully enforcing a robust monitoring, reporting, and verification system early is crucial not only to ensure smooth implementation but also to avoid the potential for data manipulation and fraud.
- It will also be important to identify policy changes and reforms early, harmonize them with the need for increased effectiveness of ETS implementation, and communicate them clearly to support regulated entities' compliance. Capacity building and continuous training for enterprises are also key.
- Adjusting the ETS's design and implementation modalities to align with the rapidly changing global and national policy environments as well as international commitments can bring additional challenges for its full and timely implementation, but it is necessary to foster an economy-wide decarbonization.
- Opening up markets to more actors such as the financial sector can increase liquidity, which can in turn facilitate a transparent price signal. But it can also increase the risk of market manipulation, which could exacerbate underpinning issues in a nascent ETS market.
- It is important to define upfront the role of offsets, including sources and reliance on existing crediting mechanisms. There must also be clarity on the potential for domestic credits to be used as a vehicle to attract international investments in non-ETS sectors. The linkages between the domestic and international carbon markets must be determined at the earliest possible date.
- Translating and transitioning subnational instruments into a national framework poses challenges and complexities, including in relation to governance and institutional responsibilities. This may be more challenging in jurisdictions where subnational governments have greater levels of autonomy.