

STEEL ENTERS CHINA'S NATIONAL EMISSIONS TRADING SCHEME

Expansion across China's heavy industry

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INTRODUCTION

The long-anticipated announcement of new sectors to be included in China's national Emissions Trading Scheme (ETS) officially now covers the steel, cement and aluminium sectors.¹ The three industries, encompassing approximately 1,500 sites, have been incorporated into China's carbon market. This addition increases the covered emissions by about 3 billion tonnes from the original 5 billion tonnes, expanding the proportion from 40% to 60% of total national CO₂e emissions.^{2 3}

A NEW ERA FOR CHINA'S ETS

Following this expansion of the ETS, companies across the power, steel, cement and aluminium sectors will participate in centralised trading of emission allowances through the National Carbon Emission Trading System. As the power sector has its own set of rules, the newly added sectors are set to have the following key rules apply:

- The greenhouse gas (GHG) control scope for these three industries covers direct emissions from fossil fuel combustion and industrial processes, excluding indirect emissions.
- For the 1st year (2025), allowances will be based on verified 2024 emissions, these emissions will be equal to the allowances freely allocated to companies in the newly added sectors.
- For the subsequent two years (2026 & 2027), allowance will be based on carbon intensity, allowing for production levels to increase but maintaining a focus on efficiency improvements.
- After 2027, benchmarks will be established and allowance allocations gradually tightened. It is currently unclear how both intensity and benchmarks will be established.^{4 5}

STEEL JOINS THE ETS

CO₂ is the only greenhouse gas regulated in the steel industry. CO₂ emission intensities vary significantly across different steel production processes. The traditional blast furnace-basic oxygen furnace (BF-BOF) steelmaking process, which accounts for 90% of China's crude steel output, produces approximately 2 tonnes of CO₂ per tonne of crude

¹ https://www.mee.gov.cn/xxgk/xxgk03/202503/t20250326_1104736.html

² <https://www.mee.gov.cn/xxgk/xxgk03/202503/W020250326367625819894.pdf>

³ https://www.mee.gov.cn/zcwj/zcjd/202503/t20250326_1104769.shtml

⁴ Where emissions exceed a company's allowances, it must buy more allowances from the market. If emissions are lower, it can sell allowances and generate revenue. China Emission Allowances (CEA) are traded on a dedicated trading platform managed by the Shanghai Environment and Energy Exchange.

⁵ The definition of power sector already includes combined heat and power and captive power plants of sectors outside power generation (for participants with annual emissions of 26,000 tCO₂ or more although the Ministry of Ecology and Environment (MEE) has discretion over qualifying participants).

steel due to its intensive fossil fuel use. This makes it a significant contributor to China's steel-related carbon emissions.

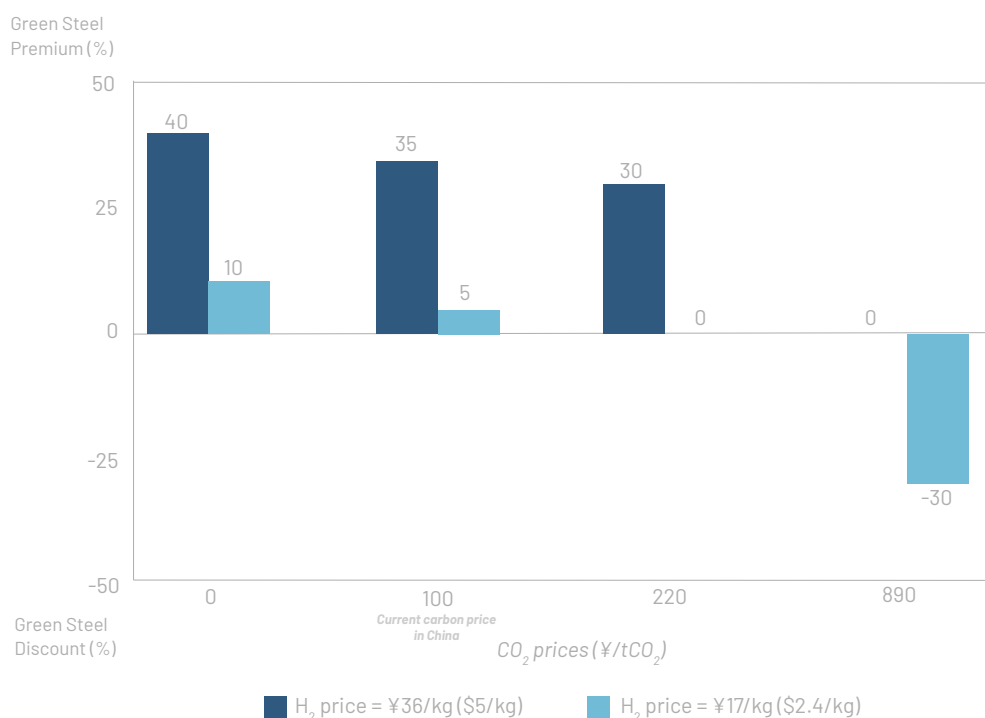
In the steel industry's first-year, allowances will be based on verified actual carbon emissions from 2024. In the following two years, allocation will follow a carbon emission intensity control approach, with allowances linked to product output rather than preset absolute caps. The system will establish baselines using average or advanced levels of carbon emissions per unit of output. Steelmakers emitting below the baseline will accumulate surplus allowances, while those above will face shortages. This approach does not restrict total production.⁶ After the initial three years, allowances will be gradually reduced, decreasing the total amount of CO₂ emissions the steel sector can produce. It is at this point that market prices are likely to be established, and if well designed, the ETS will see allowance prices increase.

CARBON PRICING FOR GREEN STEEL IN CHINA AND THE GAP TO MEANINGFUL PRICES

At \$14 per tonne of CO₂, China's carbon price is significantly lower than Europe's, where the EU carbon price exceeded €100 per tonne in 2023. This raises important questions about what carbon price heavy industry in China would consider meaningful as the ETS expands.⁷

Below is an analysis of where the difference is between the levelised cost of steel for H₂-DRI-EAF production relative to BF-BOF. Both for a \$5/kg price of green hydrogen and the target hydrogen price of \$2.4/kg in China.

Figure 1: Green Steel Price Differential Across Carbon Pricing Scenarios in China



Source: TA analysis

⁶ https://www.ideacarbon.org/news_free/64774/?pc=pc

⁷ <https://www.reuters.com/markets/carbon/europes-carbon-price-hits-record-high-100-euros-2023-02-21/>

Our analysis indicates that:

1. Even with current carbon prices (around 100 yuan/tonne) the green steel premium can be reduced to 35%.
2. At China's 2030 hydrogen target of \$2.4 per kilogram (about 17 yuan), carbon prices would only need to rise to 220 yuan/tonne (~\$31/tonne) to achieve parity.
3. To achieve zero premium with current green hydrogen prices, carbon prices would need to reach 890 yuan/tonne (~\$124/tonne), or 8.9 times the current price in China and 1.6 times the EU price.

After two early performance cycles, China's national ETS is functional and has avoided serious issues (unlike many other schemes around the world). In less than 3 years, the carbon price in China has more than doubled, exceeding 100 yuan/t CO₂ in April 2024 for the first time (about 14 USD).⁸ For a steel sector with razor thin margins and many steelmakers in China operating at a loss, the impact of an additional cost, even at a globally low level of 14 USD, is material and will likely range in the region of 5-10% of total steel costs.

STRENGTHENING THE ETS FOR EFFECTIVE IMPLEMENTATION

The ETS has now had two bespoke "performance cycles" (2019-2020, 2021-2022) and is currently in its third (2024-2025) where the allowances for a calendar year are traded the following year. The reward-penalty mechanism has taken shape and the average surplus allowance for each participant with a surplus is about 140,000 tonnes, which is equivalent to 9.52 million yuan in the form of economic incentives (based on the average carbon price in 2023 of 68 yuan/tonne). On the flipside, the average allowance shortage for participants with allowance deficits was about 125,000 tonnes, which is equivalent to 8.5 million yuan.⁹

While these are marginal values, in 2023, CO₂ intensity decreased 2.38% for thermal electricity generation, 8.78% for electricity and 2.5% for combined heat power plants compared to the 2018 level.¹⁰ This has many drivers beyond the ETS, but the national direction is clear and the ETS, an important policy signal.

In the short term the following developments are recommended to ensure the ETS operates as planned:

- Benchmarking technologies in a way that rewards low carbon solutions and current government targets for production routes like Scrap-EAF. High carbon benchmarks should also be re-evaluated and tightened regularly as heavy industry accelerates investment and learning rates are still high for green technology.
- Increasing the stringency of intensity benchmarks overall as well making increases in allowances after peak emissions in 2030 the exception rather than the rule. A step towards a quantity-based ETS.
- Introducing auctions for allowances rather than free allocation.^{11 12}

⁸ <https://www.mee.gov.cn/ywdt/xwfb/202407/W0202407222528850763859.pdf>

⁹ https://www.mee.gov.cn/ywdt/zbft/202410/t20241021_1089827.shtml

¹⁰ https://www.mee.gov.cn/ywdt/zbft/202410/t20241021_1089827.shtml

¹¹ <https://iea.blob.core.windows.net/assets/c630ee99-2c14-45de-bc76-e333e2c6cdd3/EnhancingChinasETSforCarbonNeutrality-IntroducingAuctioning.pdf>

¹² There is a precedent in China for restricting the number of free allowances and encouraging auctions: the Beijing regional ETS

DATA AND DISCLAIMER

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