2021 CHINA CARBON PRICING SURVEY

January 2022

Huw Slater
ICF

Dimitri de Boer
ClientEarth

Wang Shu
ICF

Qian Guoqiang
SinoCarbon

Abstract

This report summarises the results of the *2021 China Carbon Pricing Survey*. The survey elicited expectations about the future of China's carbon price from stakeholders in carbon markets in China during November 2021. Through cooperation with industrial associations, the project team reached a wide range of representatives from China's carbon-intensive industries which are already subject to or are soon expected to be subject to carbon pricing, in particular the power generation sector which is the first to be covered by China's national emissions trading system (ETS). Trading in the national ETS began in July 2020, and almost half of power sector respondents suggested that they would have allowances surplus to their compliance needs during the first compliance phase of the national carbon market. After power generation, the cement, iron and steel and aluminium sectors stand out in terms of perceived carbon market readiness. The survey results give strong confidence that carbon price levels in China will rise over time, and that carbon pricing will increasingly affect investment decisions. There is strong confidence that China will meet its target to peak carbon emissions before 2030.

Keywords

Carbon pricing, emissions trading, carbon market, public policy, stakeholder survey, China

Suggested Citation

Slater, H., De Boer, D., Qian, G., Shu, W., 2021, *2021 China Carbon Pricing Survey*, December 2021, ICF, Beijing

Address for correspondence

Huw Slater, Lead Climate Specialist, ICF
Address: Unit 3125, Yintai Office Tower C, 2 Jianguomenwai Avenue, Chaoyang District, Beijing 100022, China
Email: chinacarbonpricing@icf.com

Acknowledgements:

The survey was conducted by ICF and SinoCarbon. It received funding support from Environmental Defense Fund, Energy Foundation and the Norwegian Environment Agency, and in-kind support from ClientEarth. The authors would like to thank all of the other organisations and individuals who have contributed to make this report possible.

We are grateful for the following sector associations and their representatives for assisting with dissemination of the survey questionnaire: China Electricity Council, China Non-ferrous Metals Industry Association, China Building Material Group, China Building Material Federation, China Metallurgical Industry Planning and Research Institute and China Petroleum and Chemical Industry Association.

The survey implementation, roundtable and report drafting were supported substantially by Deng Yanan and Li Ruixin, ICF, and Ma Luyao, SinoCarbon.

Professor Frank Jotzo of the Centre for Climate Economics and Policy at Australian National University deserves a special mention, as he was the initiator and lead author of the initial survey in 2013, which served as the starting point for the series of surveys, and he provided advice to the team on methodology.

China Carbon Forum (CCF) initiated the 2013 survey together with Professor Jotzo and managed the implementation of each subsequent survey up until 2020. The survey results remain the intellectual property of China Carbon Forum. The support of CCF's General Manager Peter Edwards has been invaluable.

Table of Contents

Acronyms:

CBIRC	China Banking & Insurance Regulatory Commission
CCER	China Certified Emission Reduction (offset system)
CDM	Clean Development Mechanism
CNY	Chinese Yuan
CSRC	China Securities Regulatory Commission
ETS	Emissions Trading System
GDP	Gross Domestic Product
$MtCO_2e$	Million Tons of Carbon Dioxide Equivalent
MEE	Ministry of Ecology and Environment
MRVA	Monitoring, Reporting, Verification and Accreditation
NDRC	National Development and Reform Commission
PBOC	People's Bank of China
QFII	Qualified Foreign Institutional Investor
TCE	Tons of Coal Equivalent
tCO_2e	Tons of Carbon Dioxide Equivalent

Executive Summary

The *2021 China Carbon Pricing Survey* was undertaken during November 2021, obtaining expectations about the experience to-date and the future of carbon pricing in China from hundreds of stakeholders. The survey does not claim to be representative, but it does provide an indication of stakeholder views about the future of carbon pricing in China. The project builds on similar surveys conducted since 2013.

China's carbon market progress

Eight regional carbon markets were launched in the period of 2013 to 2016. The regional markets have experimented with different allocation mechanisms, sectoral coverage, the use of offsets, and various derivative products. In 2015, shortly before the Paris Agreement was signed, China announced that it would develop a national carbon market, and then in 2017, a 'Development Plan' to implement a national emissions trading system in the power generation sector was published by the National Development and Reform Commission (NDRC). In 2020, President Xi Jinping announced to the UN General Assembly that China would target carbon neutrality by 2060.

On December 31st, 2020, the MEE released a ministerial regulation bringing the national ETS into legal effect in February 2021. This document sets out the responsibilities of municipal-level environmental bureaus, penalties for non-compliance, and that the costs of emissions verification will be borne by the government. July 2021 saw the first trades take place on the Shanghai-based national carbon emissions exchange platform, starting at 48 CNY/tonne, very close to the average estimated price in the 2020 China Carbon Pricing Survey of 49 CNY/tonne.

Respondents

The survey received 417 responses from stakeholders in a range of sectors. 76% identified as being from carbon emitting enterprises, including 49% from companies already covered by either a regional carbon market or the national one. Of the emitting enterprises, the highest representation is from the power generation sector (33% of all respondents), followed by the building materials including cement (20%), steel (7%), chemicals (6%) and non-ferrous metals (5%) sectors. 10% of respondents are from companies providing carbon market-related services, including consultancy, verification, offset development and trading, while 3% came from research institutes. Other responses came from academia, the financial industry and local government.

32% were from provinces with regional carbon markets, over 67% from non-ETS regions, with 0.5% from companies based outside of mainland China.

Due to self-selection, it is likely that those who responded to the survey are more likely to be involved in preparation for the carbon market than those who didn't respond, possibly leading to some bias. We have sought to mitigate this effect by working with sector associations to elicit more representative industry responses. At the same time, expectations have probably been impacted by the realisation of trading in the national ETS and therefore a national price on carbon, at least in the power generation sector.

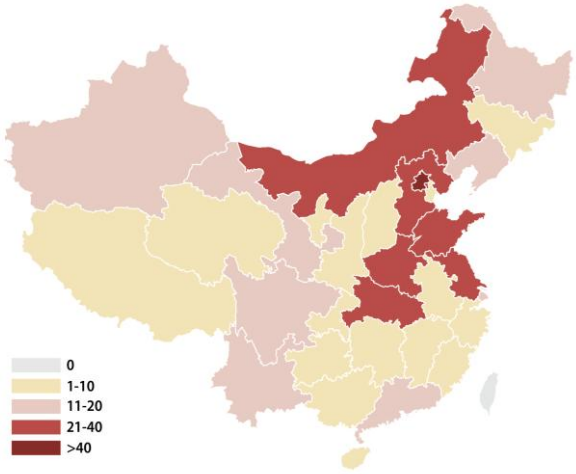

Figure i: Location of respondent organisations. n=417

China's national carbon market

Power sector respondents were asked about their company's situation during the first compliance phase of the national carbon market regarding allowance allocation. Almost half suggested that they would have allowances surplus to their compliance needs (up from 25% in last year's survey).

After power generation, the cement, iron and steel and aluminium sectors stand out in terms of perceived carbon market readiness, with over a third of respondents optimistic that they will be ready to join the national ETS by as early as 2022, and the weighted average of expectations being that those three sectors will have joined by 2023. The other key four emitting sectors are expected, on average, to join by 2024.

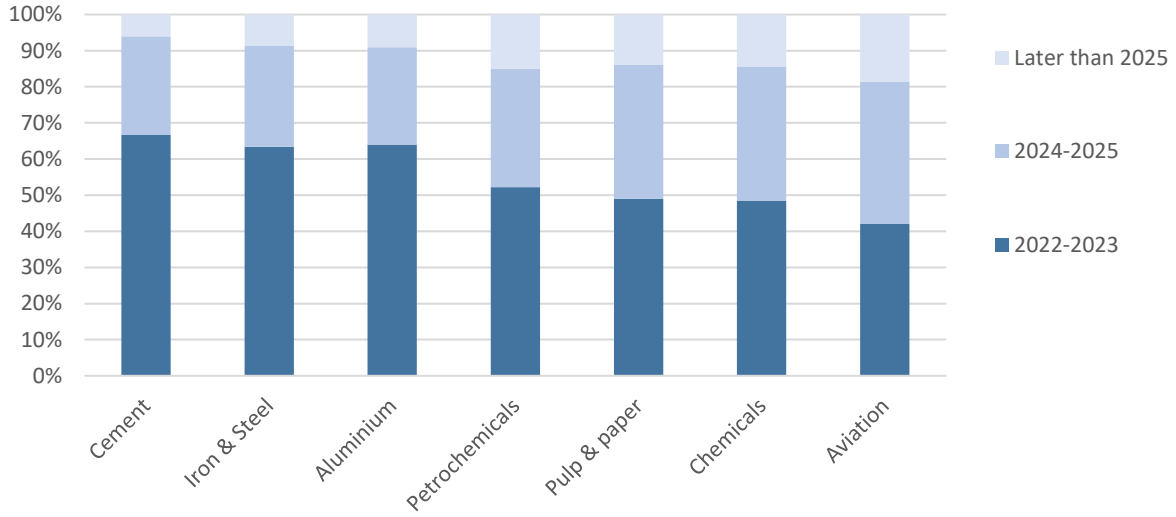

Figure ii: Which other sectors do you think will be ready to join the national system? (n=392)

Respondents expect the effect of carbon pricing on investment decisions to greatly increase between the time of the survey and the end of this decade. By 2025, about 4 out of every 5 respondents expect investment decisions to be at least moderately affected. Only 5% of respondents who answered this question expect investment decisions to be unaffected by 2025.

Carbon emissions trading is expected to increasingly affect investment decisions

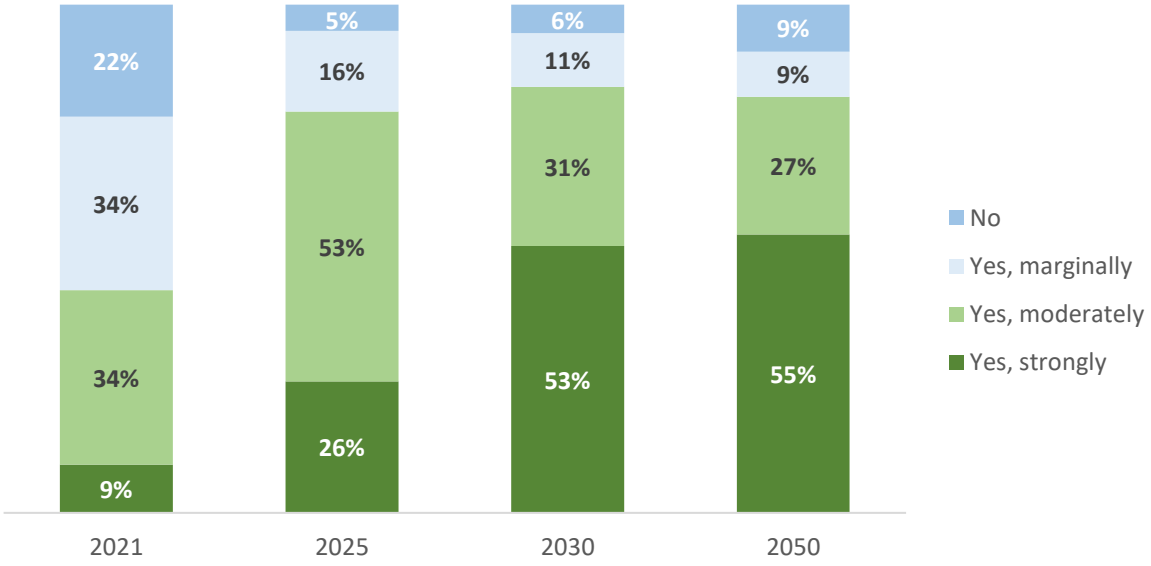

Figure iii: Do you expect the ETS in China to affect investment decisions in 2021, 2025, 2030, 2050? (n=390,390,377,347)

Price expectations

The survey results indicate an expectation of steadily rising prices, but with significant variance over the levels. The average price expectation in the national market is again expected to be CNY 49/t in 2022, rising to CNY 87/t in 2025 and CNY 139/t by the end of the coming decade. The 20th-80th percentile range grows from CNY 30/t to CNY 50/t in 2022 to CNY 50/t to CNY 200/t in 2030. The future price expectations for the near term are similar to surveys taken in 2019 and 2020, however they are higher for the middle and end of this decade than in previous years.

China's carbon price is expected to steadily rise

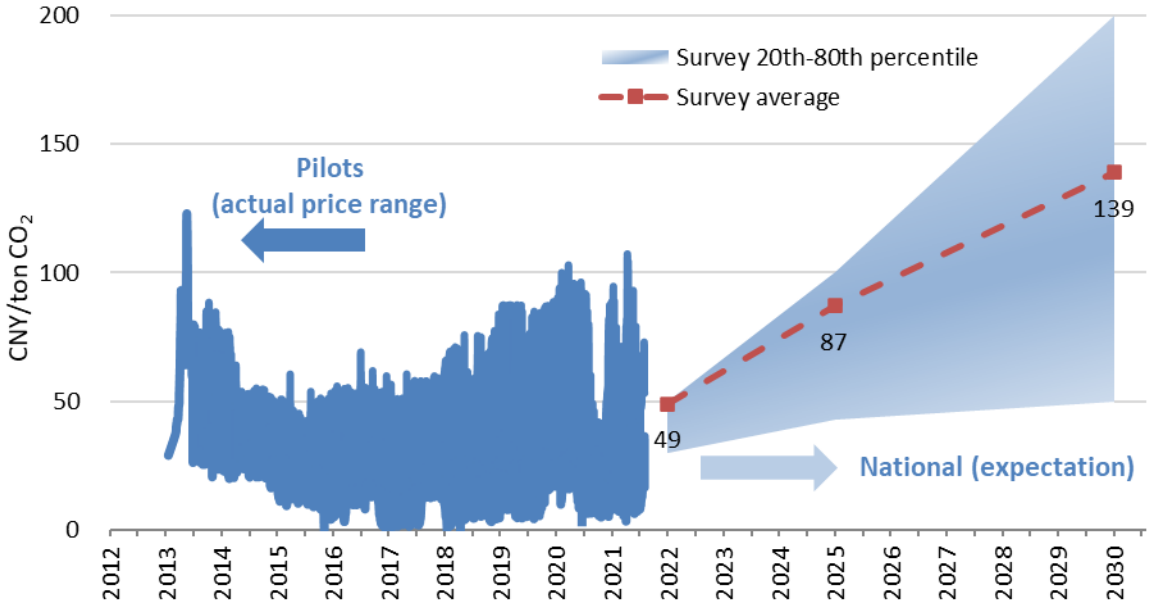

Figure iv: Range of prices in the regional systems to-date, and estimated prices for the national system.

China's emissions targets and peak emissions

In September 2020, President Xi Jinping increased China's climate ambition by committing to peak its emissions of carbon dioxide from energy consumption 'before 2030' (instead of 'around 2030'). 85% of respondents to this year's expect China to achieve the carbon emissions peak before, or no later than 2030. Only 15% expect China's emissions to peak by 2025 or earlier, down from 36% in last year's survey.

China is expected to meet its target of peaking emissions before 2030

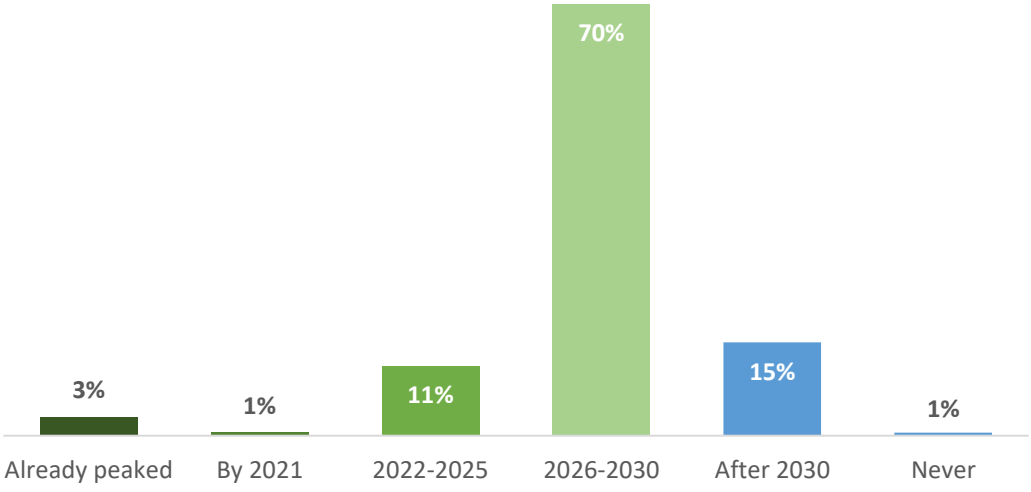

Figure v: When do you expect China's emissions will peak? (n=399)

Introduction

This report presents the results from the *2021 China Carbon Pricing Survey*, jointly conducted by ICF and SinoCarbon. It received funding support from Environmental Defense Fund, Energy Foundation and the Norwegian Environment Agency, and in-kind support from ClientEarth. The survey involved close cooperation with the China Electricity Council, China Non-ferrous Metals Industry Association, China Building Materials Federation, China Metallurgical Industry Planning and Research Institute, and China Petroleum and Chemical Industry Association.

The project builds on similar surveys conducted in 2013, 2015, and annually since 2017. Many of the questions asked were the same or similar in each survey so that comparisons can be made over time. When the surveys began in 2013, there was a strong indication of the Chinese central government's interest in using carbon pricing as a tool to reduce emissions, as it had begun to launch a series of seven pilot emissions trading systems (ETS) in various regions of the country. At that time, there was also active consideration of the potential for carbon taxation to also be used to introduce an explicit price on carbon.

Under an ETS, the government will issue or auction allowances to key emitting enterprises. The enterprises need to submit allowances equal to their own emissions at the end of each compliance cycle, otherwise they will face penalties. Companies whose emissions are less than the allowances issued by the government can sell their surplus allowances. Companies whose emissions are more than their allowances need to buy allowances in the market.

Since last year's survey, several key developments occurred in preparation for trading in a national ETS. On December 31st 2020, the Ministry of Ecology and Environment (MEE) issued "Measures for the Administration of National Carbon Emissions Trading" (hereafter "Administration Measures"), and subsequently also issued a series of rules for covered entities in the power generation sector to register and interact with the national registry systems, based in Hubei and Shanghai respectively. [1]

In July 2021, trading in the national ETS was launched, starting at 48 CNY/tonne and closing at 52.8 CNY/tonne on the opening day, hitting the daily 10% upper limit on price variation. In the first two weeks of trading, about 6 million tonnes of allowances were traded at a value of about 300 million yuan. Subsequently trading volumes reduced between August and November, with the price dipping to the mid-40 CNY/tonne range, before picking up somewhat towards the end-of-year compliance cycle.

This year's survey comes at a time of global interest in China's actions on climate change, given the start of trading in China's national ETS, which follows President Xi Jinping's 2020 commitment that China will strive to achieve peak carbon dioxide emissions before 2030 and carbon neutrality by 2060. These targets come on top of the existing specific target to reduce the carbon intensity of the country's economy by at least 65 per cent by 2030.[2]

[1] The *Rules on Carbon Trading Registration Management (trial)*, the *Rules on Carbon Trading Management (trial)*, and the *Rules on Carbon Trading Settlement Management (trial)* were released by MEE in May 2021:

http://www.mee.gov.cn/xxgk2018/xxgk/xxgk01/202105/t20210519_833574.html

[2] Carbon intensity refers to the level of carbon emissions per unit of GDP (CO_2/CNY GDP).

Before and during COP26 in Glasgow in November 2021, the EU and China issued a Joint Communique on Climate and Environment, and the US and China released a Joint Glasgow Declaration on Enhancing Climate Action in the 2020s. While China was generally seen as playing a constructive role at COP26, there is increasing attention being paid to China's domestic efforts to reduce reliance on coal. Most analyses of long-term pathways see carbon pricing playing a key role in these efforts.

As China's first explicit nationwide policy to directly limit carbon emissions, the launch of the national carbon market signifies that China has taken a significant step forward in the process of achieving its carbon peaking and carbon neutrality goals. More than 40% of China's carbon emissions have so far been covered by the national ETS, and the ETS has added to the real cost to carbon emissions. With the continuous improvement of the carbon pricing mechanism, China's carbon market is expected to grow into a large market with trading value of CNY 100 billion, which will provide a price signal and even financial support for carbon emission reduction across the economy.

The 2021 China Carbon Pricing Survey was conducted anonymously through an online survey platform, *Diaochapai*, from October 29 to December 2, 2021. A number of channels were used to communicate with potential respondents. Through cooperation with related industrial associations, strong efforts were made to survey representatives from China's carbon-intensive industries, with a special focus on the power sector, which is already subject to carbon pricing. This included dissemination of the survey to the members of the industry associations mentioned above. The survey was also sent to participants that partook in the 2020 survey who provided contact details. Finally, the survey was made available by the authors to potential respondents through targeted social media channels, in particular WeChat.[3]

The survey received 417 responses from professionals in a range of sectors, including industry, market-related services and research institutes. Over half (58%) of all respondents are either already covered by the national or regional emissions trading systems or expect to be covered by the national system. In addition, a further 18% of survey responses were from industry representatives that are either unsure or do not expect to be covered by the national carbon market, and 5% were from sectoral associations, bringing the collective representation of industry views to 81% (338 responses).

An unexpected aspect of this year's survey is that, via the China Non-ferrous Metals Industry Association, a prominent aluminium refining company disseminated the survey throughout the company, much more extensively than any other company which has previously participated in these surveys. As a result, 6,786 responses were received, which were excluded from the survey results in order to avoid drowning out the other respondents. The level of knowledge throughout the company of carbon markets is limited and so for many questions about half of these respondents chose "Don't know" with regard to technical questions regarding the national ETS. On the other hand, the responses provide an unparalleled dataset for one of the world's largest aluminium producers, and the knowledge of carbon abatement at the grass roots level of the company. For that reason, we have highlighted in the final section of the report results from a few

[3] Project partner SinoCarbon shared the survey with its WeChat channel, which at the time had over ten thousand subscribers. The project team sought responses from those with a known role working on carbon market issues for their organisations, or their known expertise on the subject matter.

select questions which were considered to be broad enough to provide higher confidence in their legitimacy.

In addition to the survey itself, the project team conducted an industry focus group and roundtable on the survey results in early December 2021. The roundtable involved industry representatives and sectoral associations, together with carbon market-related service providers. The aim of the roundtable was to provide a channel for communication of industry opinions on carbon market design, and to expand the scope of public discourse on important aspects of the national system. Links to the public report from the roundtable can be found on the China Carbon Forum website.

This survey gauges expectations by experts and market participants about the future of carbon pricing in China, and how it fits into China's broader climate change mitigation efforts. It quantifies expectations about market design, relevant policies, carbon prices, and the impact on investment decisions. As such, it can make an important contribution to improving understanding for the markets and for policymakers, of how the prospects for carbon pricing are perceived in the industry and expert communities.

The expectations elicited in this report are best interpreted as an aggregation of "best guesses" by a subset of people who have knowledge and informed views about the factors that will affect the operation of carbon pricing in China. For industry respondents, the survey's sample may be biased towards market participants with a higher-than-average level of preparedness, given that less well-prepared companies may have less certainty regarding the carbon market, and therefore be less willing to complete a survey. We have sought to mitigate this effect by working with sector associations to elicit more representative industry responses. In addition, industry has been receiving continuous capacity building support since the last edition of the survey.[4] There is no claim that the survey is representative of the views of all experts and industry on these questions, both because it is not possible to create a representative list of experts, and due to self-selection by those who chose to respond to the survey.

The expectations about future carbon prices derived from surveys such as this differ conceptually from forward prices in markets, which reflect market expectations but adjust them for risk and are subject to demand and supply of capital. They also differ conceptually from forecasts of prices that are based on quantitative analysis of underlying market factors, and assumptions about policy settings.

This report begins with an update on the status of carbon emissions trading in China to-date. It then outlines the key results from the survey, covering the experience of the regional emissions trading systems, expectations about the national system, the readiness of enterprises, the impact of carbon pricing on investment decisions, and expectations about the peaking of China's carbon emissions. This report is intended to objectively present the opinions of respondents as a reference for policymakers and market participants.

[4] For example, from December 2018 to October 2020 the EU-China ETS Platform held capacity building training for more than 8,000 industry and local government representatives in 48 provinces and cities. About 70% of the participants in this training have been local government representatives. The training conducted by MEE in late 2019 included approximately 4,600 participants, with about two thirds being industry representatives.

Update on carbon emissions trading in China

China has seen the successive introduction of eight regional emissions trading systems in various provinces and cities (Shenzhen, Shanghai, Beijing, Guangdong, Tianjin, Hubei, Chongqing and Fujian) since mid-2013, providing valuable experience for the central government to put in place a national carbon pricing mechanism. Each of the provinces has set up respective carbon intensity goals. The regional emissions trading systems have also adopted carbon intensity-based caps on emissions, rather than an absolute cap which is the case in other emissions trading systems internationally. The Chinese government believes that this approach is the most suitable given the twin demands of achieving economic growth and emissions reduction.

The National Development and Reform Commission of China issued the *Development Plan for the National Carbon Emissions Trading Market (Power Sector)* (hereinafter referred to as the "*National ETS Development Plan*") in 2017. It was decided that the national carbon market will initially conduct trading in the power generation sector, and then gradually expand the coverage as other industries develop the necessary capacity. The National ETS Development Plan put forward the goals for the development of the national carbon market, clarified the tasks to be completed prior to the start of trading activities, and confirmed a "three-step" roadmap, i.e., the development of market infrastructure, a trading simulation stage, and a stage for market maturation. According to the Development Plan, the market would enter the stage of a mature market about one year after the simulation stage was launched.

China systematically restructured government ministries under the State Council in 2018. Since then, the responsibility for developing the national carbon market shifted to the Ministry of Ecology and Environment.

The Ministry of Finance of China issued the notice on the *Interim Provisions on the Accounting Treatment Regarding Carbon Emissions Right Trading* in December 2019. The Ministry of Ecology and Environment also released a notice in 2019, officially launching the monitoring, reporting and verification of carbon emission data and requiring all regions to submit the list of key emitters in the power generation sector.

The deadline for enterprises to submit the 2019 report and verification of greenhouse gas emission data was prolonged from May 31 to July 31, 2020, due to the impacts of the COVID-19 pandemic. The central government issued several major policies or drafts in the second half of 2020, which are detailed in the section below.

Trading in the national carbon market officially opened on July 16, 2021. Trading started at CNY 48, very close to the average value (CNY 49) expected by respondents for the opening price in the *2020 China Carbon Pricing Survey*.

The first compliance cycle of the national emissions trading market came to a successful end on December 31, 2021, achieving a performance completion rate of 99.5%. By this point, the national carbon market had run for 114 trading days and recorded 179 million tons in cumulative trading volume and CNY 7.7 billion in value of traded carbon emission allowances. Of this, the volume of listed trading agreements reached 30.8 million tonnes, with CNY 1.5 billion in cumulative turnover; the volume of bulk trading agreements was 148 million tonnes, worth CNY 6.2 billion in cumulative turnover.

Review on recent milestones

Development of the national carbon market, climate investment and financing advances

Chinese President Xi Jinping announced on September 22, 2020, that China will aim to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060. Li Gao, Director General of the Department of Climate Change at the Ministry of Ecology and Environment, mentioned that the upcoming "14th Five-year" period will signify the arrival of a milestone period in the development of China's national carbon market. China will achieve the transition from pilots to a unified national market, expanding from a single covered industry to the integration of multiple industries, and maturing from the early stages of trading to continuous and stable market operation.

As for enabling investment and financing activities to better serve climate change mitigation and adaptation actions, the Ministry of Ecology and Environment, the National Development and Reform Commission, the People's Bank of China, the China Banking and Insurance Regulatory Commission and the China Securities Regulatory Commission jointly released the *Guiding Opinions on Promoting the Investment and Financing in Response to Climate Change* in October 2020, making strategic arrangements for China's endeavour to develop investment and financing in response to climate change in the coming five years. Major contents of the *Opinions* include expanding the scope of trading entities in the carbon market, exploring and developing carbon financial products. The *Opinions* specifically mention "maximizing the incentive and restraining role of the carbon emissions trading mechanism". The release of the *Opinions* has brought more opportunities for the initiation and further development of the national emissions trading market.

Legislation and penalties for the national ETS

The Ministry of Ecology and Environment issued a *Notice on Soliciting Opinions on the Interim Regulations on the Administration of Carbon Emission Trading (Revised Draft)* on its official website on March 30, 2021, further seeking opinions on the revised regulations of the State Council on the administration of carbon emission trading.

Compared with the *Measures for the Administration of Carbon Emissions Trading (for Trial Implementation)* issued on December 31, 2020, and the *Interim Regulations* issued in 2019, the new draft of the *Interim Regulations on the Administration of Carbon Emission Trading* refined regulators, added content on risk prevention and control, intensified penalties for violation and made clear the orientation of local carbon trading platforms.

The *Regulations* clarifies the maximum administrative fine which can be imposed against enterprises in violation of the regulation, ranges from RMB100,000 to RMB500,000 against non-performance and deducts the number of allowances not fully settled in the ensuing year. The current *Measures for the Administration* issued on December 31, 2020, only specifies fines of between RMB20,000 and RMB30,000 and a deduction of the arrears in the ensuing year. This is unlikely to be a sufficient deterrent.

Registration and settlement rules clarified; more trading entities expected to be introduced

On May 19, 2021, the MEE issued the *Rules for the Administration of Registration of Carbon Emissions (for Trial Implementation)*, the *Rules for the Administration of Trading of Carbon Emissions (for Trial Implementation)* and the *Rules for the Administration of Settlement of Carbon Emissions (for Trial Implementation)* on its official website, which further regulate the registration, trading and settlement of national carbon emission allowances. The three documents all came into force on the date of issuance. These three documents further set forth specific provisions on registration, settlement and trading on the basis of the *Measures for the Administration of Carbon Emissions Trading (for Trial Implementation)*, providing direction and policy basis for Hubei and Shanghai to formulate specific operating rules in the next step. Compared with the draft for comments, the three documents were upgraded to varying degrees. Some technical issues are left to the exchanges or registration bodies to decide, thereby guaranteeing the balance between direction and flexibility. On the whole, the rules for registration and settlement have become relatively clear. It is expected that financial institutions and individual investors will gradually join in trading in the future.

National carbon trading began

At 9:30 am on July 16, 2021, trading in the national ETS was officially launched. Han Zheng, Vice Premier of the State Council, Ding Xuedong, Executive Deputy Secretary-General of the State Council, Sun Jinlong, Party Secretary of the MEE, Huang Runqiu, Minister of the MEE, and Xie Zhenhua, China's special representative on climate change affairs attended the launching ceremony for online trading in the national carbon market. The carbon emissions of over two thousand power companies were covered in the first period of trading, exceeding 4 billion tons. This means China's carbon market has become the world's largest in terms of the amount of carbon emissions covered, as the scale has exceeded that of the EU.

The trading entities of the national carbon market are key emitting units as well as eligible institutions and individuals. During the initial stage of the market, spot trading of allowances is only carried out among 2,162 key emitting enterprises in the power sector. It is expected that financial institutions and individual investors will gradually join in trading in the future.

The national carbon market will be expanded during the "14th Five-Year Plan" period

During the "14th Five-Year Plan" period, the national carbon market will gradually cover eight energy-intensive industries, including petrochemicals, chemicals, building materials, steel, non-ferrous metals, papermaking and civil aviation, in addition to the power sector. The first compliance period of the national carbon market covers 2,162 enterprises that emit more than 26,000 tons of carbon dioxide a year in the power generation sector. Although the volume of emission is large, there is little variation in the cost of carbon emission reductions for thermal power generation units, given a high degree of homogeneity within the industry. The gradual inclusion of more industries with high emissions, including aviation, papermaking and building materials, and the introduction of more emitting entities with varying mitigation costs will help to give more full play to the role of market-based carbon pricing.

Transaction data for China's carbon market

National carbon market

As of December 31, 2021, 178.79 million tons of allowances had been traded in the national carbon market, with the value of CNY 7.661 billion. The national carbon emissions trading market had been in operation for 114 trading days. Specifically, the cumulative trading volume of listing trading was 30.7746 million tons, with the total value of CNY 1.451 billion; the cumulative trading volume of bulk trading was 148.0148 million tons, with the total value of CNY 6.21 billion. The closing price on December 31 was CNY 54.22/ton, up by 12.96% from the opening price on the first day. More than half of the key emitting units actively participated in the market trading.

The first compliance cycle of the national carbon emissions trading market had been successfully ended by December 31, 2021. The compliance rate stood at 99.5%. Since the start of the online trading, the national carbon market has seen stable operation, growing awareness of emission reduction of enterprises, and increasingly active market. In general, the role of the national carbon market as a key policy tool to control and reduce greenhouse gas emissions and promote the realization of carbon peaking and carbon neutrality goals has emerged gradually.

Figure 1: Price trend in national carbon market (CNY/ton)

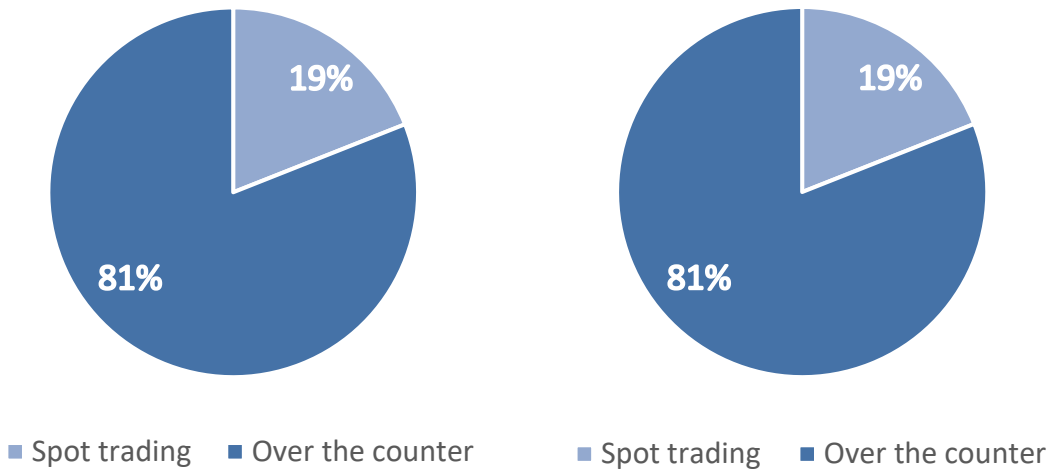

Figure 2: Proportions of spot trading and over the counter by trading volume (left)/trading value (right)

Pilot carbon markets

Since the pilot carbon markets were launched in 2013 and 2014, most have matured substantially, have introduced measures to improve liquidity and considered whether and how to expand the scope of their system.

By December 31, 2021, 71.99 million tons of allowances had been traded in the eight pilot carbon markets, with the trading value of CNY 2.4 billion. Guangdong was the most active among the pilot carbon markets, with the total trading volume of 189.59 million tons and the trading value of CNY 4.46 billion, followed by Hubei with the trading volume of 104.28 million tons and the trading value of CNY 2.38 billion. Shenzhen, Shanghai and Beijing also witnessed active transactions, with the trading volume of 65.17 million tons, 47.9 million tons and 47.37 million tons, respectively. Tianjin, Chongqing and Fujian saw relatively low levels of trading, with their volume standing at 26.73 million tons, 22.26 million tons and 13.31 million tons, respectively.

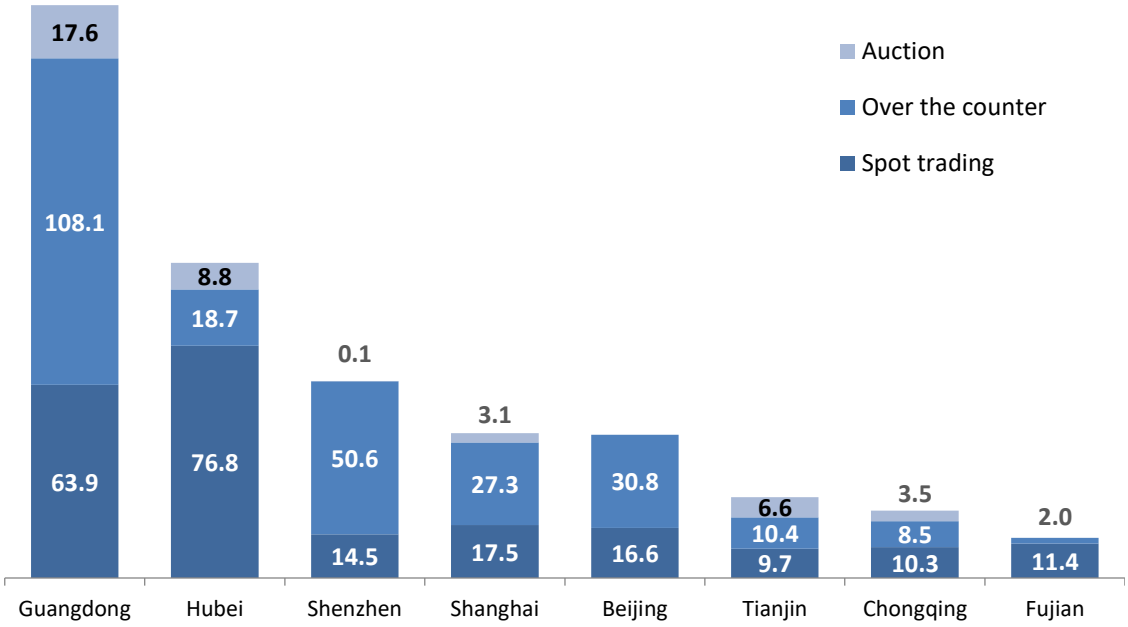

Figure 3: Cumulative trading volume in the 8 pilot markets as of December 31, 2021 (million tons)

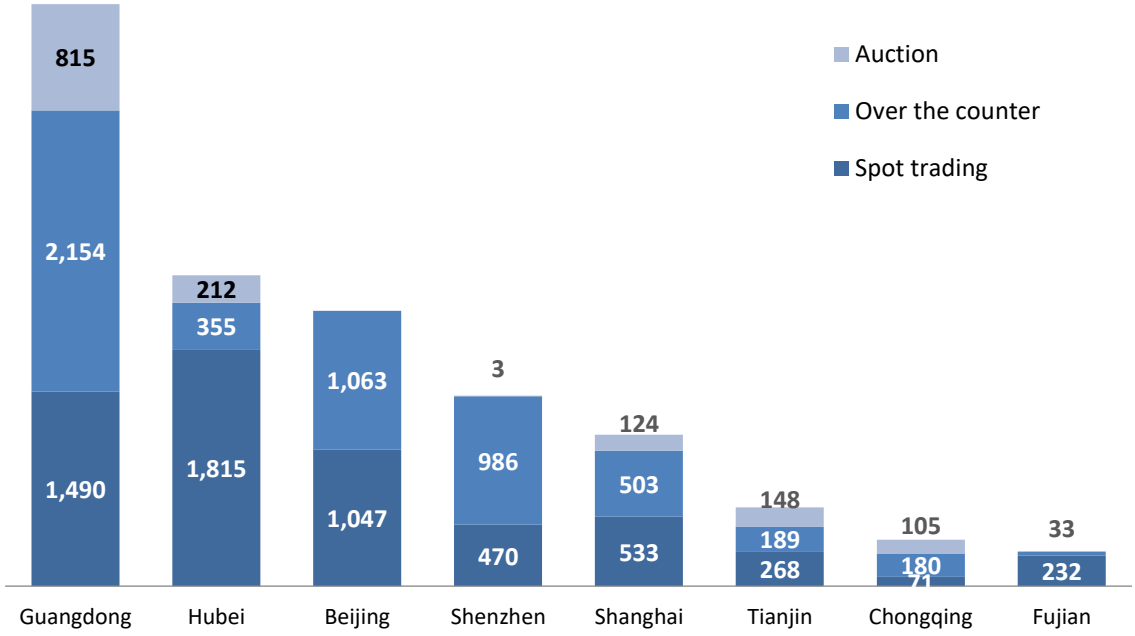

Figure 4: Cumulative trading value in the 8 pilot markets as of December 31, 2021 (million CNY)

Summary of allowance price changes during 2020-21

Beijing	The price in Beijing was above CNY 80/ton for most of the year.
Shanghai	Shanghai's carbon price fluctuated around CNY 40/ton all year.
Hubei	The price stayed around CNY 30-40/ton.
Guangdong	Guangdong's carbon price showed an upward trend and stabilized at around CNY 50/ton.
Tianjin	Transactions in Tianjin's carbon market were concentrated in the first half year, and the price currently stayed around CNY 28/ton.
Fujian	Fujian's carbon price fell below CNY 10/ton at the end of 2020, and gradually rebounded to nearly CNY 20/ton in 2021.
Chongqing	Chongqing's carbon price showed an upward trend, rising from about CNY 25/ton at the beginning of the year to CNY 30-40/ton, and stabilizing at around CNY 35/ton at the end of 2021.
Shenzhen	The price fluctuated between CNY 15/ton to CNY 25/ton in 2021, and there were big differences in the price of different varieties of allowances.

Table 1 Price trends in pilot markets during 2020/21, ranked in order of price at the close of trading on December 31, 2021

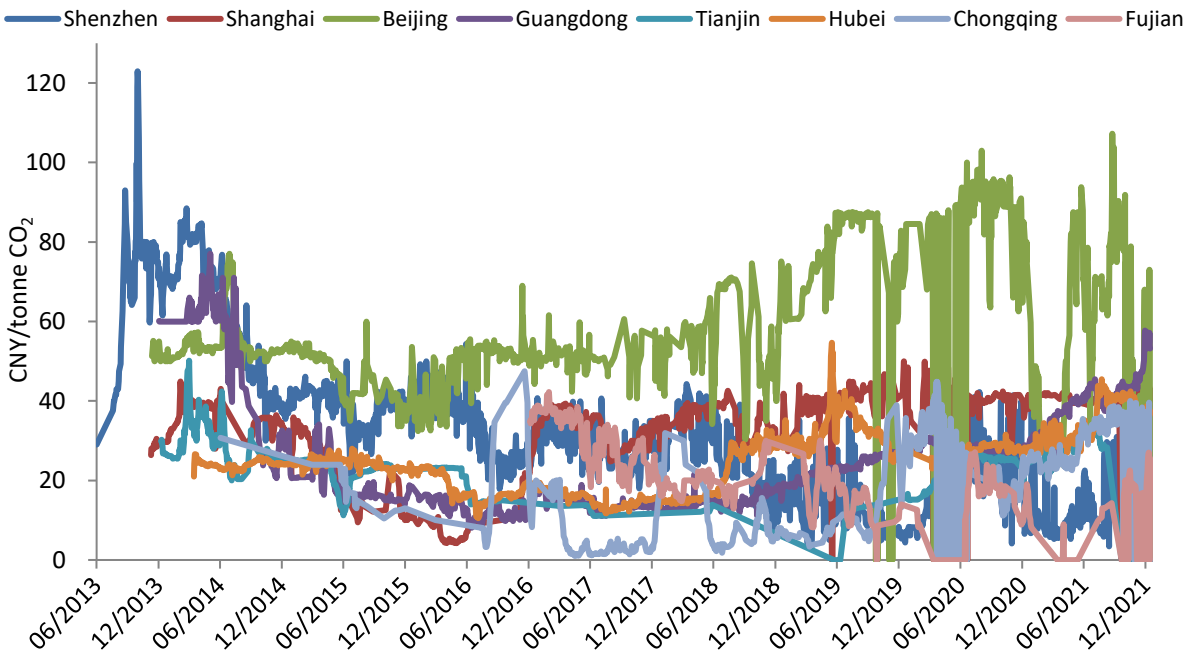

Figure 5: Monthly average price of online trading (CNY/ton), June 2013 – December 2021

Offset Credits—China Certified Emission Reductions (CCER)

CCER is an important part of China's carbon market. In March 2017, the NDRC announced the suspension of all applications related to CCER projects and CCER registration, which has not been resumed yet. As of the resumption of CCER registration, 2,856 CCER projects had been publicized for review and 1,047 had been registered (287 of which had been issued) by the NDRC.

The *Measures for the Administration of Carbon Emissions Trading (for Trial Implementation)* published for comment in November 2020 stipulates that emitting companies can use CCERs to offset up to 5% of their emissions. The CCERs used for offset should come from emission reduction projects in areas such as renewable energy, carbon sinks, and methane utilisation.

On October 26, 2021, the MEE issued the *Notice on the Clearing and Settlement of the Carbon Emission Allowances in the First Compliance Cycle of the National Carbon Emissions Trading Market*, specifying that enterprises are allowed to use CCERs to offset no more than 5% of their emissions this year. There is no restriction on the varieties and generation time of CCERs except that CCERs used shall not come from emission reduction projects included in the national carbon market allowance management. This means that tens of millions of tons of CCERs previously in the market are allowed to enter the national carbon market, which greatly enhance the market vitality and increase the price of CCERs. In 2021, 176.78 million tons of CCERs were traded, registering a significant increase from last year. As of December 31, 2021, 440 million tons of CCERs had been traded in the primary and secondary markets.

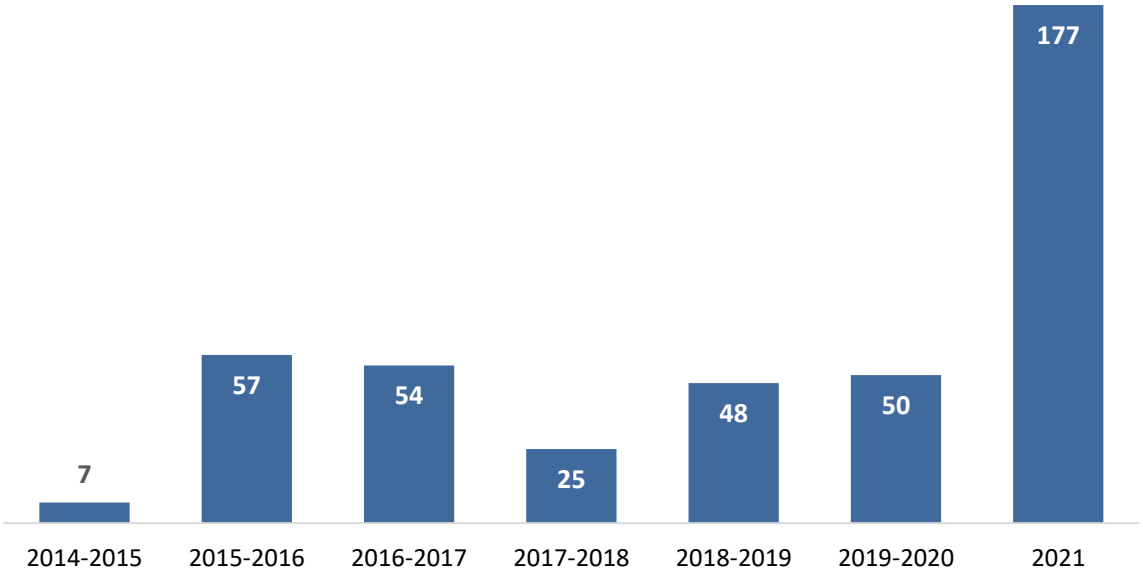

Figure 6: CCER trading volume (million tons)

Status of the National Carbon Market

The table below summarises the current status and future trends of national ETS development:

	Current status	Future trends
Policy	In November 2020, the *National Carbon Trading Management Measures* and the *National Carbon Allowance Registration and Settlement Management Measures* released by MEE. On March 29, 2021, the *Guidelines on the Verification of Corporate Reporting of Greenhouse Gas Emissions (trial)* was released. On March 30, 2021, the MEE posted a *Notice on Publicly Soliciting Opinions for the Interim Regulations on Carbon Trading Management* (revised draft), in a bid to solicit opinions on the State Council's revised carbon trading regulations. In May 2021, the *Rules on Carbon Trading Registration Management (trial)*, the *Rules on Carbon Trading Management (trial)*, and the *Rules on Carbon Trading Settlement Management (trial)* were released. On October 23, 2021, the MEE issued a *Notice on Emission Allowance Settlement in the First Compliance Cycle of the National Carbon Trading Market* and published *Procedures on Using CCERs for Allowance Settlement in the First Compliance Cycle of the National Carbon Market*.	The MEE will work towards the finalization of the *Interim Regulations on Carbon Trading Management*, gradually expand the industries covered by the carbon market, diversify trading categories and trading methods, and will fully bring into play the important role of the carbon market in addressing climate change and contributing to carbon peaking and carbon neutrality.
Coverage	The power generation sector is the first to be covered by the national emissions trading system.	Other key emitting sectors will be covered once conditions met.
Allowance allocation	In December 2020, the MEE issued the *Implementation Plan for Allocating Carbon Emission Allowances for 2019 to 2020 in the National Carbon Market (Power Sector)*, clarifying the list of key emitters subject to allowance management and the categories of units, as well as total allowances. All the 2019–2020 allowances were allocated free of charge and benchmarks were used for the accounting of the allowances of key emitters. The allowances of key emitting entities amount to the sum total of the allowances allocated to units under their ownership. Allocation plans for cement and electrolytic aluminium formulated and trial calculation conducted.	The allowance allocation plan for the national carbon market in 2021 is being formulated.
Monitoring, reporting & verification (MRV)	The *National Carbon Trading Management Measures* have made a series of regulations on MRV. The *Guidelines on the Verification of Corporate Reporting of Greenhouse Gas Emissions (trial)*, released in March 2021, stipulates the principles, procedures, re-verification process and disclosure requirements for the GHG reports of key emitters.	As coverage of the national carbon market expands, the government should conduct more effective data quality management, build a sound system for data accounting, reporting, and verification, enhance information disclosure and the development of the credit system.

	The *Guidelines on Accounting Methodology and Reporting on GHG Emissions for Enterprises (revised)*, released in December 2021, clarified the accounting boundaries and definition of units, intensified quality control and process management regarding emissions data, improved the accounting details and enhanced operability, ensured fairness and consistency, updated the average emissions factor for the national power grid, and added information disclosure requirements for technical service providers.	
Compliance	The *National Carbon Trading Management Measures* stipulate that a fine of CNY 20,000 to 30,000 shall be imposed on units that fail to perform obligations, and the outstanding amount will deduct the next year. The *Interim Regulations on Carbon Trading Management (revised draft)*, released by the MEE in March 2021, clarified the degree of punishment to the incompliant enterprises by stipulating that a fine of CNY 100,000 to 500,000, as well as the deduction of the outstanding amount in the next year, shall be imposed on incompliant units.	Non-compliant units may also face additional punishment, such as public shaming, negative credit scores, and possibly even criminal prosecution.
Supporting systems	In May 2021 the official website of the national registry based in Wuhan came online. On July 16, the National Carbon Trading System came online at Shanghai Environment and Energy Exchange.	
Offsets	The National Carbon Trading Management Measures stipulate that emitters can use CCERs to offset up to 5% of their emissions. The CCERs used should come from projects in areas such as renewable energy, carbon sinks, and methane utilisation. In October 2021, the *Procedures on Using CCERs for Allowance Settlement in the First Compliance Cycle of the National Carbon Market,* stipulated that CCERs used for compliance should meet the following conditions: (1) Offsets shall not exceed 5% of the allowances to be settled; (2) CCERs shall not come from emission reduction projects that come under the cap of the national carbon market; (3) all available CCERs generated prior to March 2017 will be eligible in the first compliance cycle of the national carbon trading market. It also defined the specific procedure on using CCERs for meeting compliance obligations.	The MEE is revising the management rules on the trading of voluntary emission reduction of greenhouse gas. Going forward, it will improve relevant system design, introduce offsets, carbon financial derivatives trading, among others to guide market expectations, gradually diversify trading categories, methods, and players, so as to form reasonable carbon pricing.
Transition plan of pilots	Key emitters in the regions conducting local pilot carbon trading since 2013 will be gradually incorporated into national ETS and subject to unified management. Pilots continue to operate and will transition to national ETS once conditions are met. In July, Li Gao, Director of the MEE's Climate Change Department, said at a State Council Policy Briefing that the MEE will cease to support new local pilots and will consider a specific timetable for transition.	The detailed transition plan is still being researched.

Table 2: Status of the National Carbon Market (as of December 31, 2021)

Survey respondents

417 eligible responses are included in the analysis. The number of respondents this year was the second highest so far, compared with the 2020 survey (567), 2019 (389), 2018 (317), 2017 (260), 2015 (304) and 2013 (86).

The survey features strong representation from industry, as well as a significant number of responses from China's expert community on carbon markets, consultancies and academic expert advisors. It provides a reasonable indication of views and expectations among China's carbon market community.

Within this report, unless otherwise stated, percentages refer to the proportion of respondents who provided an answer to a particular question, excluding those who selected 'Don't know'.

Survey respondents by groups

Of the 417 respondents, 76% of respondents identified as being from carbon emitting enterprises, including 49% from companies already covered by either a regional carbon market or the national one. Of the emitting enterprises, the highest representation is from the power generation sector (33% of all respondents), followed by building materials including cement (20%), steel (7%), chemicals (6%) and non-ferrous metals (5%) sectors.

10% of respondents are from companies providing carbon market-related services, including consultancy, verification, offset development and trading, while 3% came from research institutes. Other responses came from academia, the financial industry and local government.

Survey respondents by group

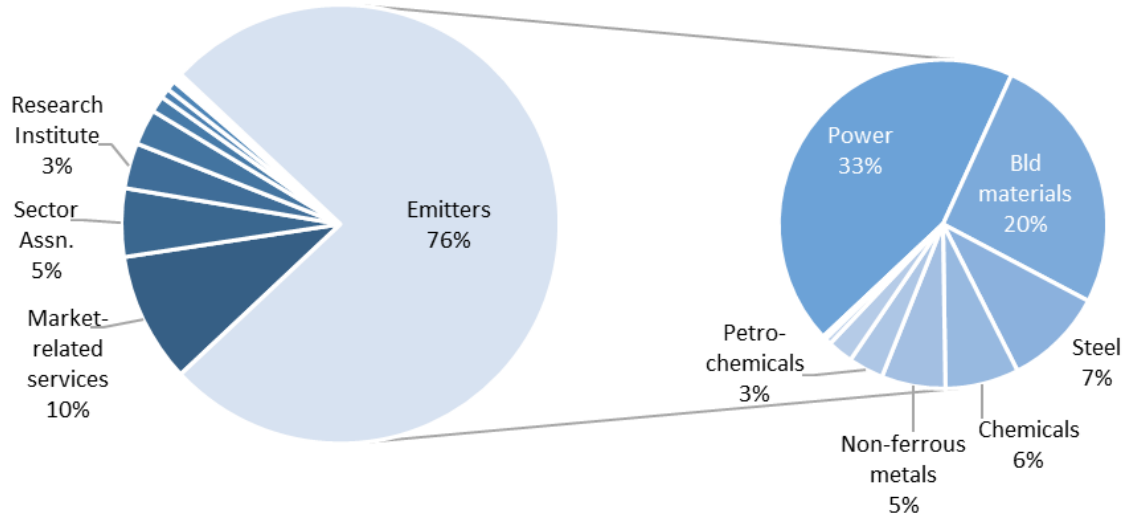

Figure 7: How would you classify your organization?
Note: total number of responses n=417.

Responses by region

16% of the respondents to the survey are from organizations located in Beijing. 32% were from provinces with regional pilot carbon markets, 67% from non-pilot regions. Only 2 responses (0.5%) from organisations not based in mainland China.

The relatively high level of responses from Beijing reflects the concentration of the policymaking, consultancy and expert communities in the capital city, and also because the project partners have stronger networks in Beijing. After Beijing, the highest number of respondents were from Shandong (8%) and Hubei (7%).

The geographic spread of respondents has increased with each iteration of the survey, reflecting a growing engagement in carbon markets across the country.

Survey respondents by region: increasingly widespread

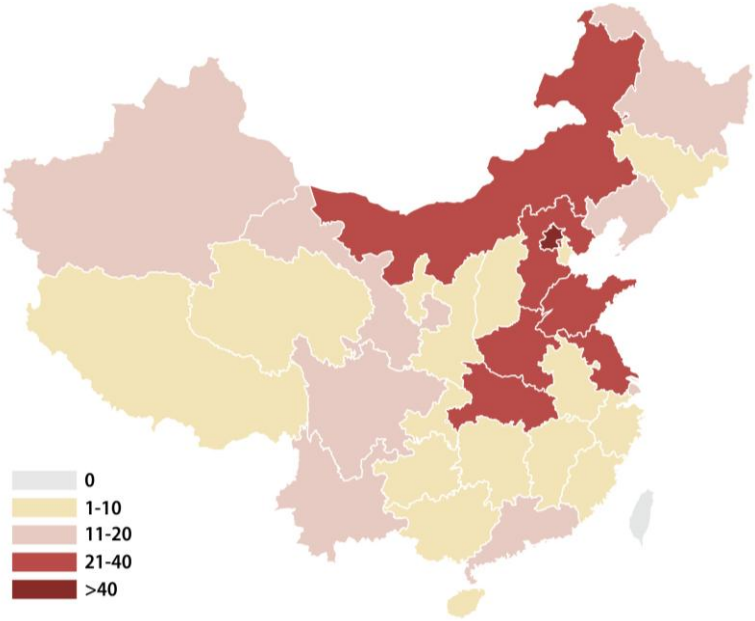

Figure 8: Location of respondent organisations (n=417)

Industry responses

The share of industry respondents overall, including sectoral association, has risen steadily over the years: representing 81% of this year's respondents, up from 76% in 2020, 68% in the 2018 and 2019 surveys, 29% in 2017, 23% in 2015, and 7% in 2013.

This year's survey included responses from 203 from already covered entities. This represents a significant step up in the representation of companies with practical experience in complying with carbon pricing mechanisms, as previously this was only the case for respondents from regional covered entities (66 in 2020, or 12% of all respondents).

36% of emitting enterprises have participated in the regional pilot emissions trading systems, including participants in each of China's regional pilot carbon markets, with especially good representation from companies operating under the Hubei (48) and Shanghai (40) systems.

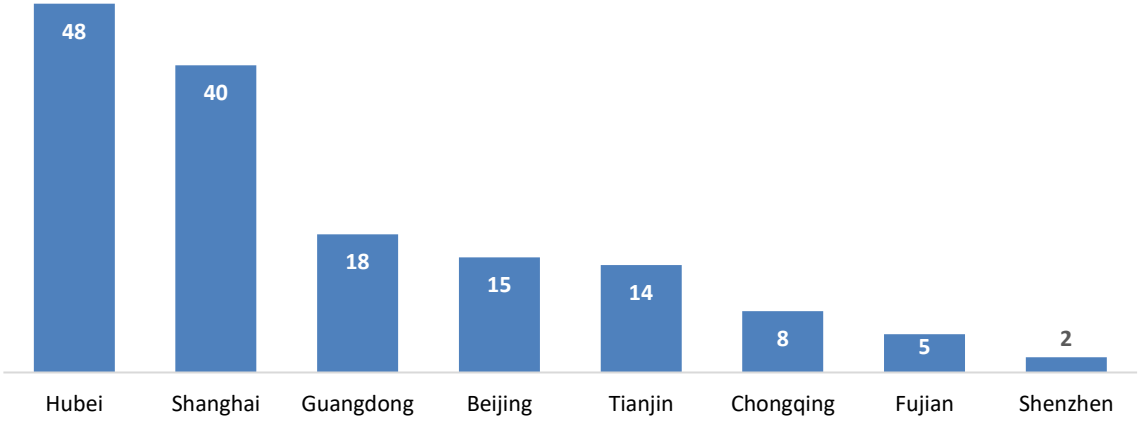

Figure 9: Is your company currently operating under an emissions trading system(s) in China? If Yes: Which of the following? (n=96)

11 industry respondents were from companies currently operating in an ETS outside of China, 10 of which are involved in the EU ETS. For these companies, working under more than one ETS jurisdiction may facilitate experience sharing, industry peer to peer learning, and eventual integration across systems.

For respondents from emitting enterprises, over half identified as general staff, while 33% of responses were from mid-level managers. This year's survey received 22 responses from senior executives, the highest number since the 2018 survey.

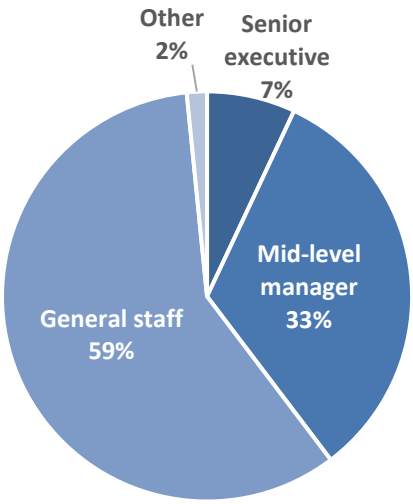

Figure 10: In the management structure of your company, what position do you hold? (n=315)

Of the responses from emitters, 53% identified themselves as belonging to central state-owned companies, with another 14% from local state-owned enterprises. 16% of respondents from covered entities were from privately owned companies. 37% of the covered entities were very large energy consumers, reporting energy consumption of over 1 million tce/year, and 33% reported consumption of between 100 thousand to 1 million tce/year. 8% came from small companies with energy consumption of under 10,000 tce/year, which is the threshold for inclusion in the national carbon market. Very large emitters are dominated by central state-owned enterprises (80). Central government SOEs tend to be among the largest emitters in China.

Industry respondents by size and ownership type

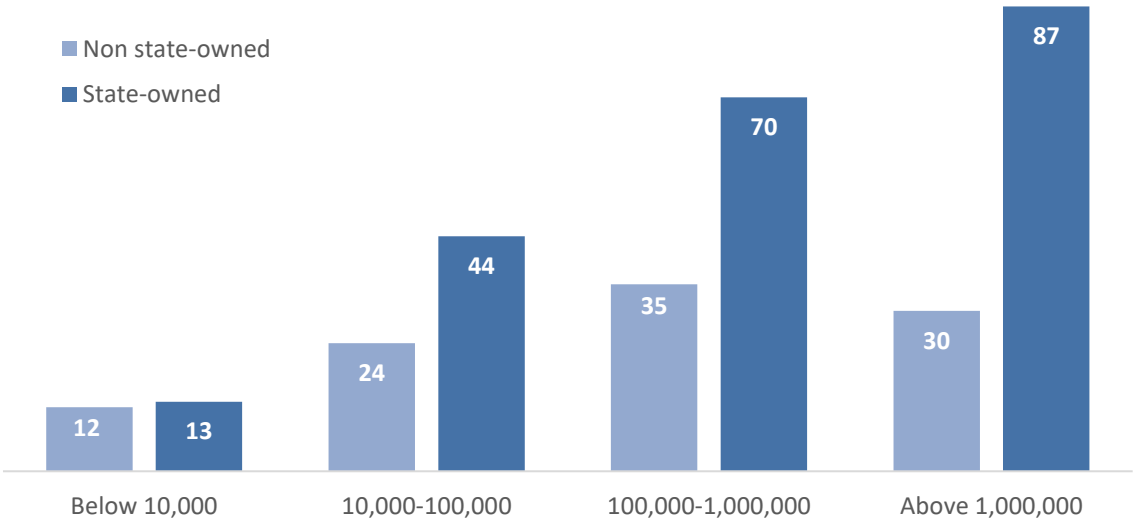

Figure 11: How much energy does your company annually consume in China? – by enterprise type (tce/year) (n=315)

Regional emissions trading systems

The China Carbon Pricing Survey has been tracking expectations and views on real market developments in the regional emissions trading systems from the pilot phase through several compliance cycles to their current status as mature carbon markets.

Prices in the regional systems

Respondents based in pilot regions were asked about their future expectations for prices in the regional markets, both for the highest and lowest prices in the regions, providing a range of expected prices for the years ahead. For context, prices in the regional systems ranged from CNY 7/t in Fujian to CNY 79/t in Beijing around the time of the survey. The full spread of regional prices is outlined in figure 5 on page 9 above.

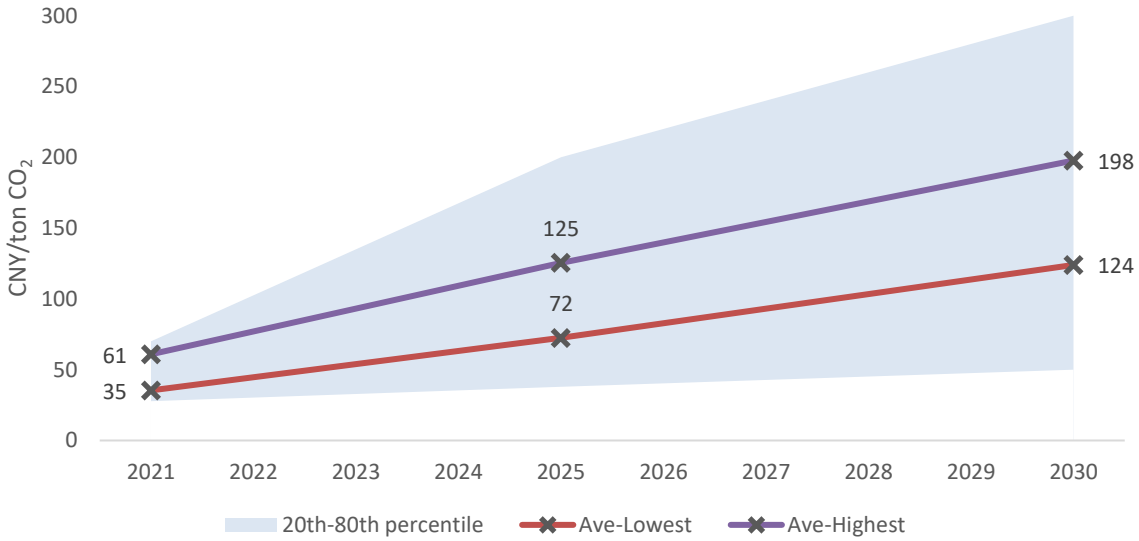

Figure 12: What do you expect the highest and lowest prices in the pilot regions to be in the coming years? (n=123,124,123)

When asked which of the regional markets would have the highest average price in 2021, the most common choice was the Beijing emissions trading system.

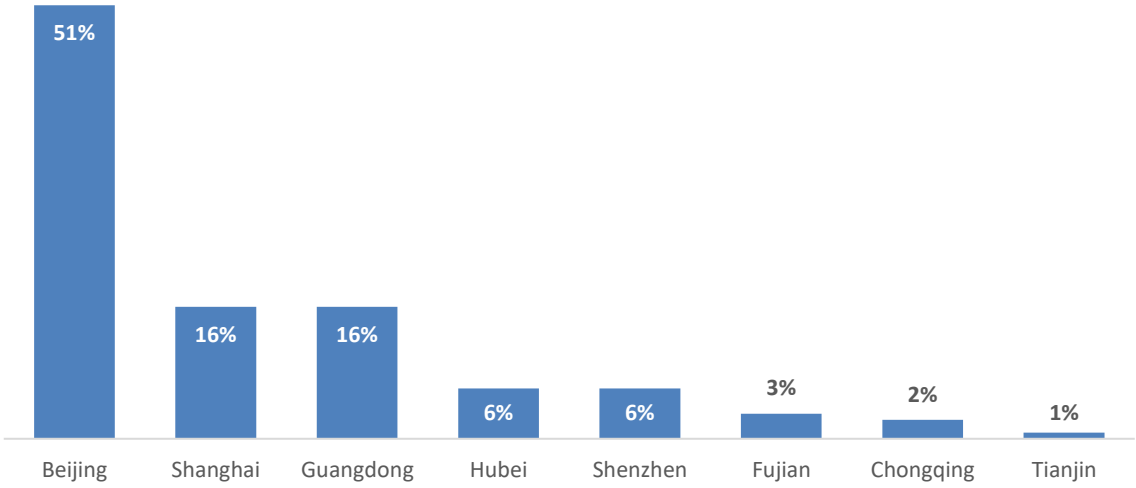

Figure 13: Which pilot do you expect the highest average prices in 2021? (n=135)

Selected quotes on prices in the regional systems in the coming years:

- The pilot carbon market will be gradually phased out, making it difficult to realise higher carbon prices. – *Beijing carbon market-related service provider*
- From the perspective of the global greenhouse gas emissions control, a gradually increasing carbon price is the market trend. This gradual increase in the carbon price also further promotes greenhouse gas emissions reduction. – *Hubei power generation industry*
- Among the current pilot areas, Beijing has the highest carbon price, while Fujian and other underactive pilots have relatively low carbon prices. However, Beijing has now completed the 2020 annual compliance, transactions tend to be light, and the possibility of carbon prices hitting new highs is low. This year, the low carbon price in the local market will probably not deviate too much from the low point of the national carbon market. The national carbon market will complete compliance before the end of the year. The current carbon price is more than 40 yuan, and the low carbon price in the pilot market will not exceed 30 yuan. In the following years, the carbon price will also be analysed in combination with policy changes and macroeconomic prosperity. – *Beijing carbon market-related service provider*

This year's survey asked for the first time about how the shift of the power sector from the pilots to national ETS was expected to affect the prices in pilot markets. Although the vast majority of respondents believe there will be an impact, there was a fairly even spread between those who expected lower prices and those who expected higher prices.

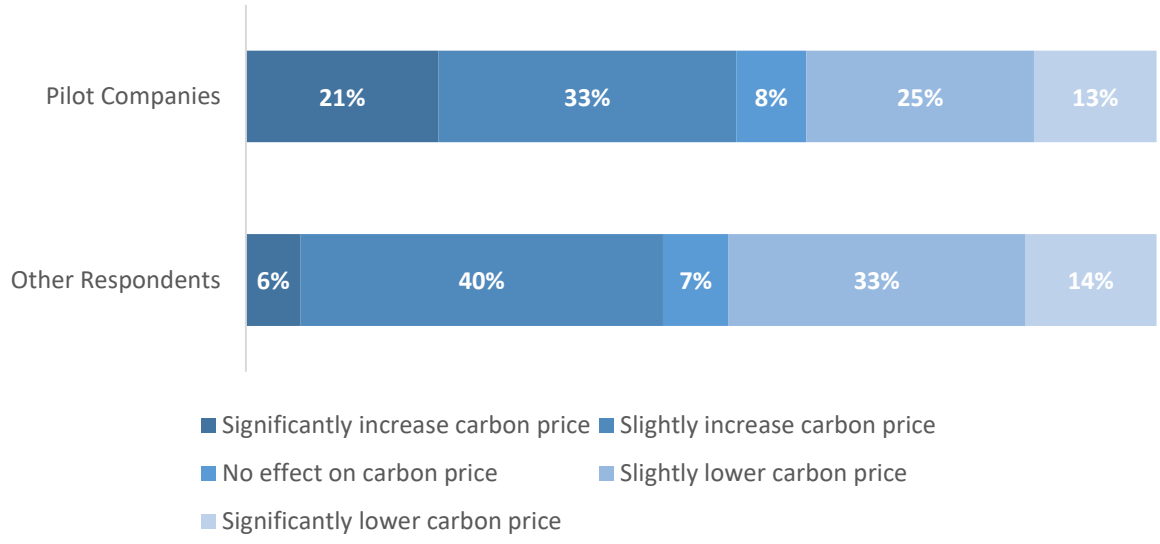

Figure 14: How do you expect the shift of the power sector from the pilots to national ETS affect the price of pilot market? (n=135)

National emissions trading system

Survey respondents were asked a number of questions regarding the national emissions trading system, including with regard to sectoral coverage, management of the market and price expectations.

Sectoral coverage

After electricity generation, the cement, iron and steel and aluminium sectors stand out in terms of perceived carbon market readiness, with over a third of respondents expecting them to be ready to join the national ETS by as early as 2022, and the average of responses being that those three sectors will have joined by 2023. The other key four emitting sectors are expected, on average, to join by 2024.

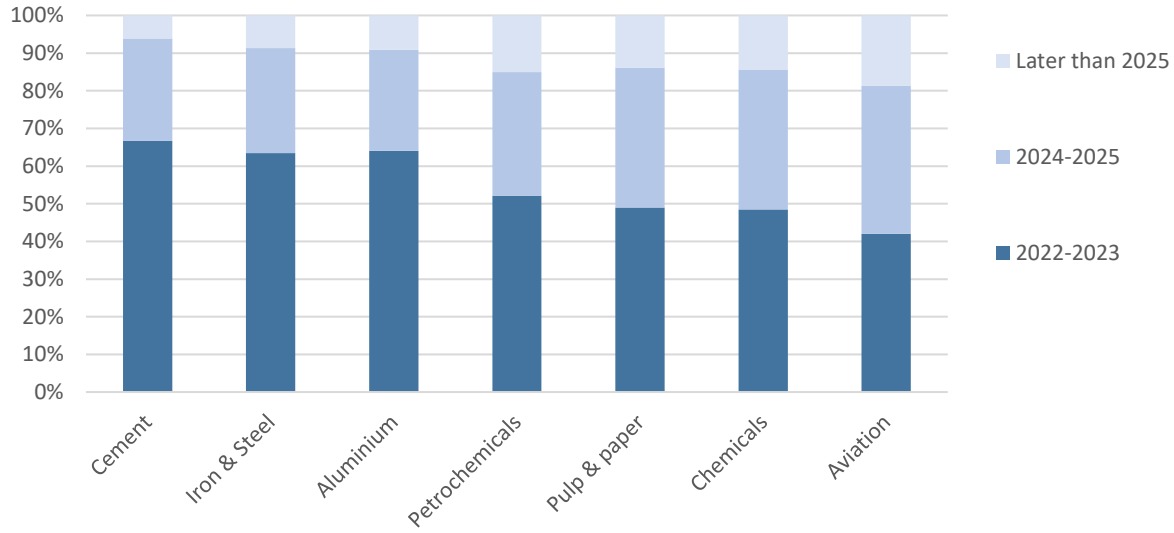

Figure 15: Which other sectors do you think will be ready to join the national system? (n=392)

Management of the national carbon market

Benchmarking and historical (grandfathering) allocation are two common methodologies for free allowance allocation in an emissions trading system. Benchmarking calculates allowance allocation to installations or entities based on a benchmark value in one sector, which usually represents good performance in that sector and is determined based on reported GHG emissions data. Historical allocation calculates the allowance allocation in relation to an installation or entity's historical GHG emissions level in past years. Historical allocation may be unfair to companies which have already performed well in past years, and/or which are growing quickly. Benchmarking allocation tends to be fairer but is more complex to regulate and calculate.

Allocation for the first compliance period in the national carbon market for the power sector followed a benchmarking approach. The majority of respondents from the sectors covered by cooperating industry associations identified benchmarking as the most appropriate methodology for allocating allowances. In last year's survey, steel sector respondents had preferred historical intensity-based allocation by a slim margin. Very few industry representatives consider auctioning to be the best method of allocation at the current time.

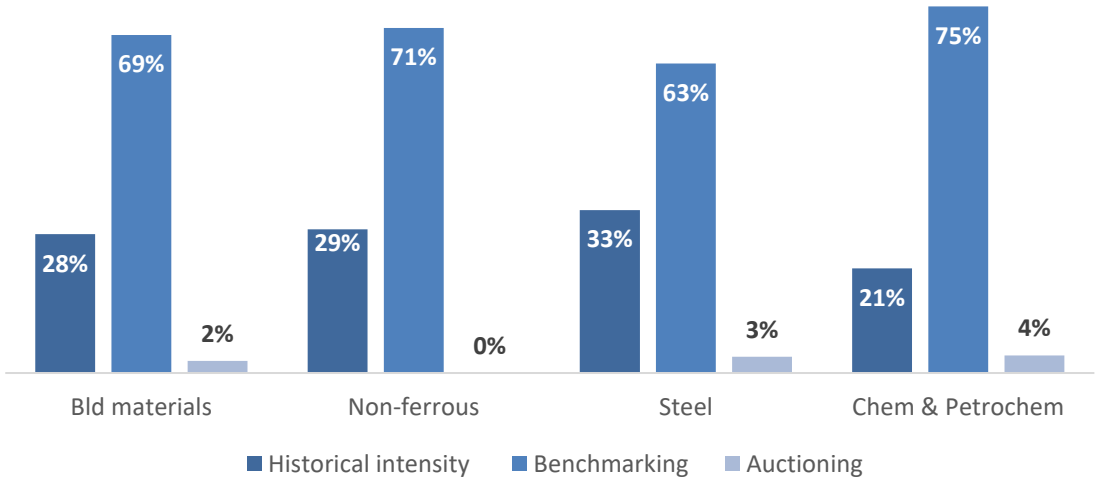

Figure 16: What do you think is the best method to allocate allowances? (n=81,17,30,28)

A new question introduced this year asked power sector respondents whether the benchmarks set for the national ETS are adequate to encourage GHG emission reduction. Very few respondents suggested that the benchmarks were 'too generous'.

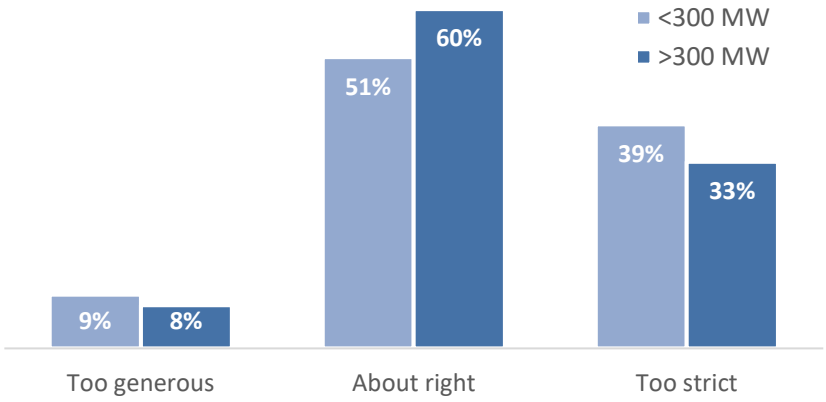

Figure 17: Are the benchmarks set for the national ETS adequate to encourage GHG emission reduction? (n=127,119)

Selected quotes from power generators on the adequacy of allowance allocation benchmarks:

- It's unreasonable that 600MW sub-critical units share a benchmark with all types of units over 300MW, resulting in a large allowance shortfall and a significant increase in operating costs for enterprises. It is also unreasonable to include small-scale heat-supply enterprises together with cogeneration units for allowance allocation…The definition of a cogen unit should be according to it reaching a certain ratio of power generation to heat supply. – *Sichuan company*
- There should be a unified benchmark. Those with high efficiency should enjoy the benefits of carbon trading, and those with low efficiency should bear the corresponding costs. – *Zhejiang company*
- There are many units above 300MW, all of which undertake peak shaving to varying degrees. Therefore, the emission benchmarks should be further refined and disaggregated. – *Hubei company*
- There should be a compensation coefficient according to the operating age of the unit, which should be implemented year by year. Thermal power generation is under great pressure to transform. – *Heilongjiang company*
- For circulating fluidized bed units using coal gangue, the quality of coal is poor, the calorific value is low, and energy consumption is high, so the benchmark should be increased accordingly. – *Inner Mongolia company*

Power sector respondents were asked how frequently the benchmark should be updated. About half prefer a frequency of every five years, while over a third believe that annual updates are appropriate. Five of those who chose 'other' suggested intervals between one and five years (i.e. two or three years).

Benchmarks need to be regularly updated

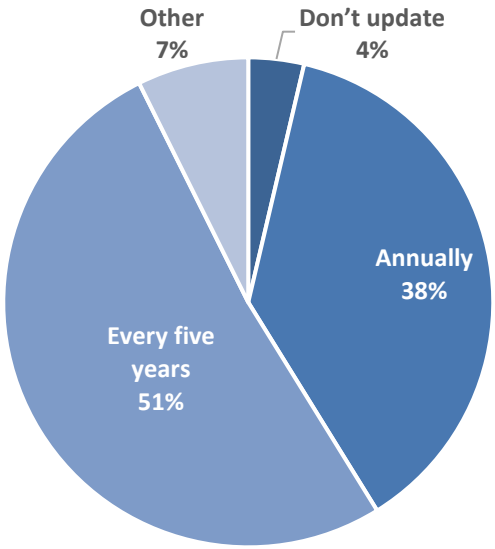

Figure 18: How frequently should the benchmark be updated? (n=136)

Selected quotes on the updating of benchmarks:

- At present, many units are newly built and decommissioned every year, and the ratio of unit capacity is constantly changing. It is recommended to update the benchmark every two years. – *Anhui power generation company*
- Considering the encouragement of renewal, low-carbon technologies should be encouraged, and backward technologies should be constrained. However, the time should not be too short, as the time for advanced enterprises to benefit will be limited, and the pressure on backward companies will be too great. – *Liaoning power generation company*

40% of those with a view expect that there will be auctioning of allowances by 2025, while most respondents expect this to occur post-2025.

Auctioning of allowances expected to be introduced by 2030

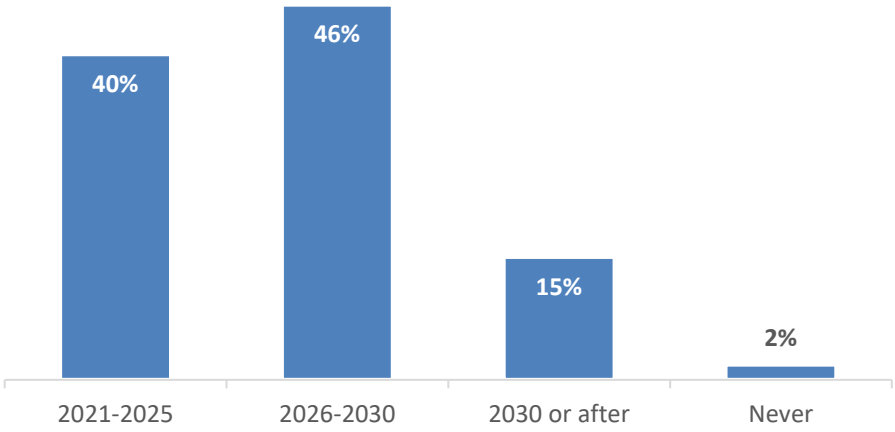

Figure 19: By when do you expect auctioning of emission allowances to be introduced into the national ETS? (n=382)

Over half of power sector respondents think that the MRV guidelines released by the MEE in 2021 are functionable for the needs of the national ETS.

Many believe that the MRV guidelines are adequate

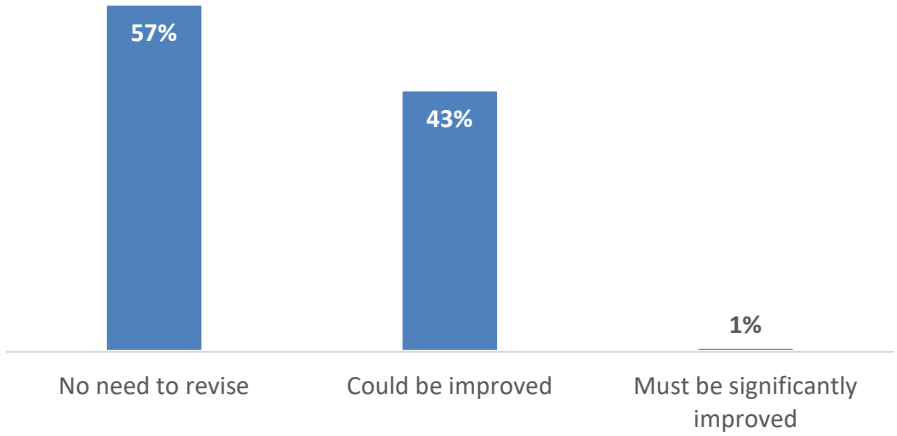

Figure 20: Do you think the MRV guidelines released by the MEE this year are functionable for the needs of the national ETS? (n=122)

32% of respondents believe that the installation of a constant emissions monitoring system (CEMS) is the most crucial measure to ensure the credibility of GHG emissions data of entities.

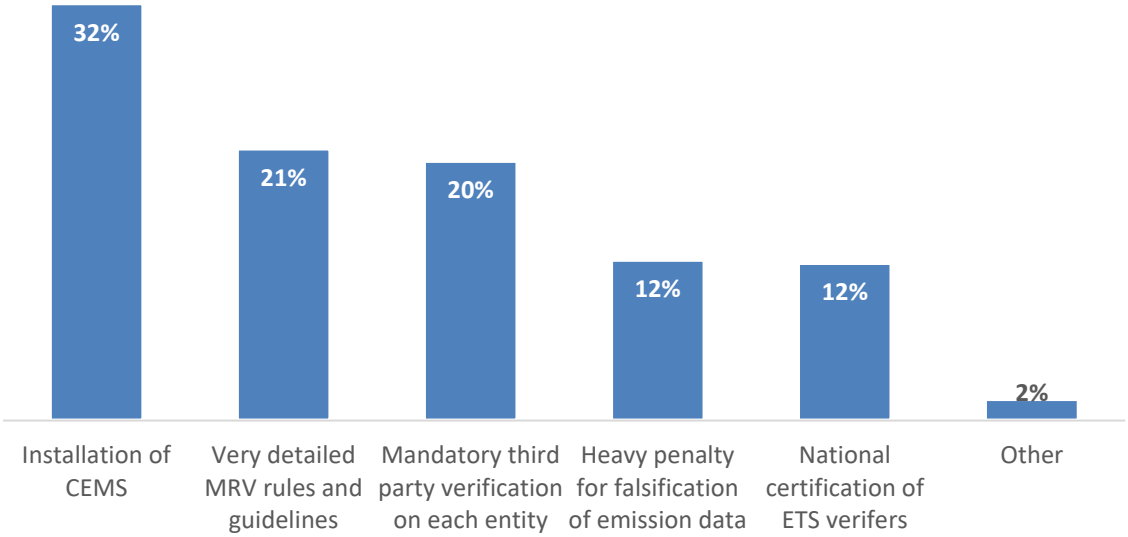

Figure 21: Which measures do you consider most crucial to ensure the credibility of GHG emissions data of entities? (n=417)

Selected quotes on ensuring the credibility of GHG emissions:

- Heavy fines and third-party verification need to be used together. Without verification, there is no objective evaluation standard for fines. Without heavy penalties, verification and results are worthless. – *Shanghai chemicals company*
- Combination of various measures: very detailed verification guidelines; heavy penalties if found out; strengthening the professionalism and rigor of verification agencies. The allowable error of CEMS needs to be reduced to less than 1/100,000. – *Hubei enterprise*
- Consistency of third-party verification agencies and the verification methodology. The punishment mechanism for underreporting and dishonest enterprises needs to be implemented in a unified way. – *Beijing research institute*

Half of respondents believe that publication of emissions data could be made mandatory by 2025 (up from 43% last year). 11% believe that it should never be made mandatory.

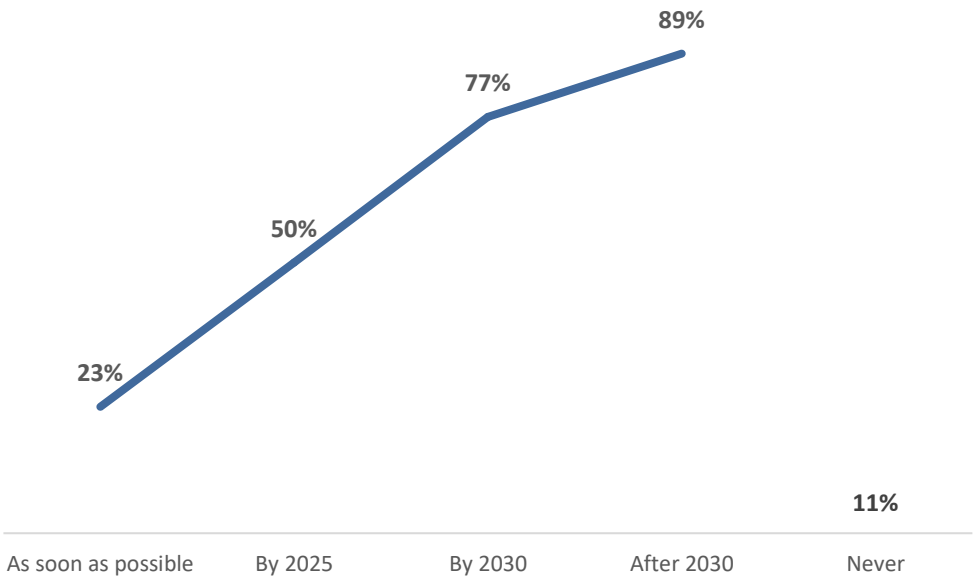

Figure 22: By when do you think that publication of emissions data could be made mandatory? (cumulative) (n=394)

Respondents were asked what types of data should be made public, in order to support transparency of the market. A majority identified annual company-level emissions data, sectoral emissions data, the status of allocated allowances and company level compliance status as the main priorities.

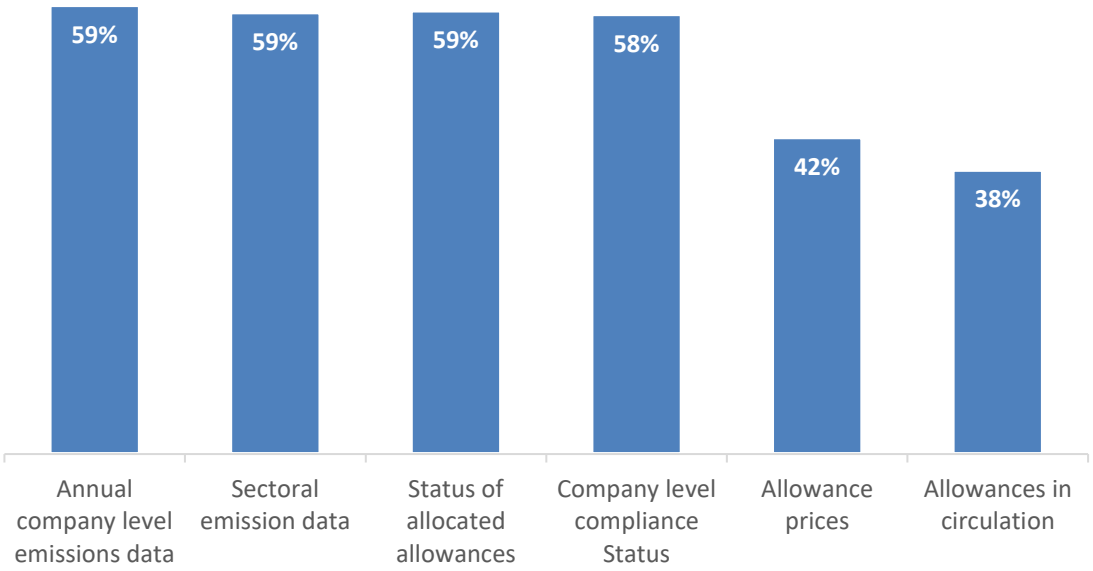

Figure 23: What data should be made public, to support transparency of the market? (n=413)

Respondents were asked about the level of penalty or incentive structure would be strong enough to ensure a high percentage of compliance. The most popular choice was a negative credit record for non-compliant companies, whereby companies' ability to secure finance from banks may be affected. This is consistent with previous results.

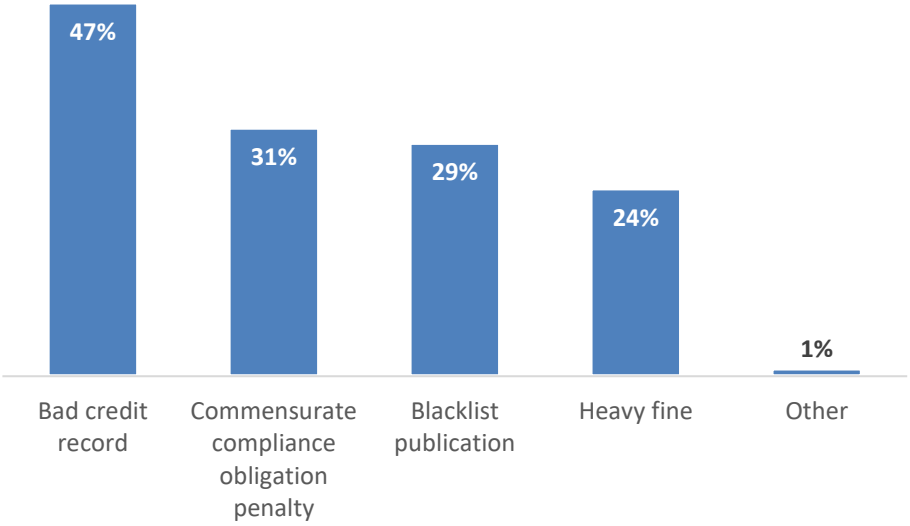

Figure 24: What level of penalty/incentive structure would be strong enough to ensure a high percentage of compliance? (n=379)

Half of respondents believe that non-covered entities should be able to participate in the national carbon market by 2025.

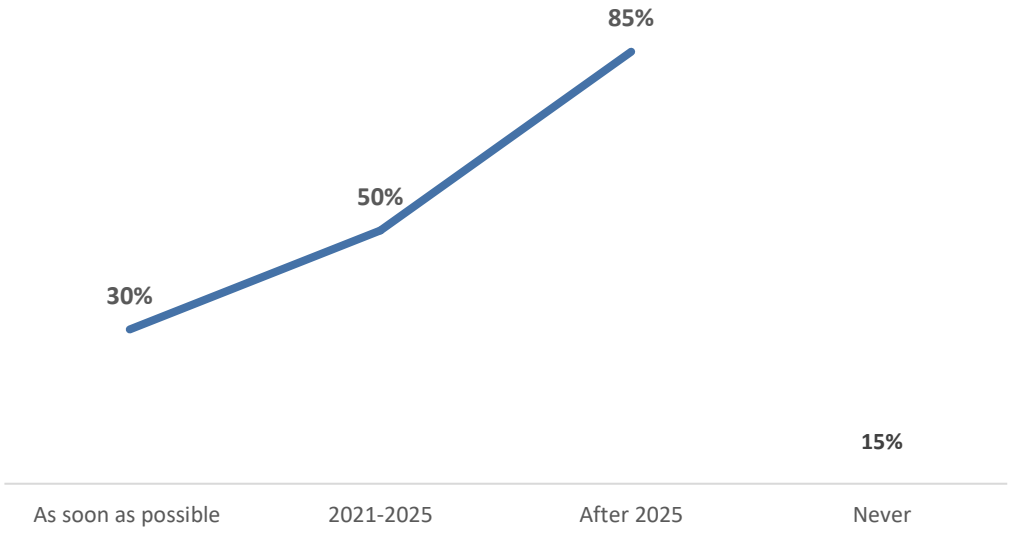

Figure 25: By when do you think that non-GHG emitting entities should be able to participate in the national carbon market? (n=394)

Respondents were asked to identify one type of carbon financial product that they consider most suitable for early introduction in the national carbon market. The most popular choice was 'futures'.

Carbon futures are derivative financial contracts that obligate the parties to transact allowances at a predetermined future date and price. Here, the buyer must purchase, or the seller must sell the underlying allowances at the set price, regardless of the current market price at the expiration date. A repurchase agreement is the equivalent of a short-term, collateralised loan. An owner of allowances sells those allowances to a buyer for cash. As part of the deal, the seller agrees to buy back the securities at a later date. The price paid to repurchase the allowance is higher than the original selling price.

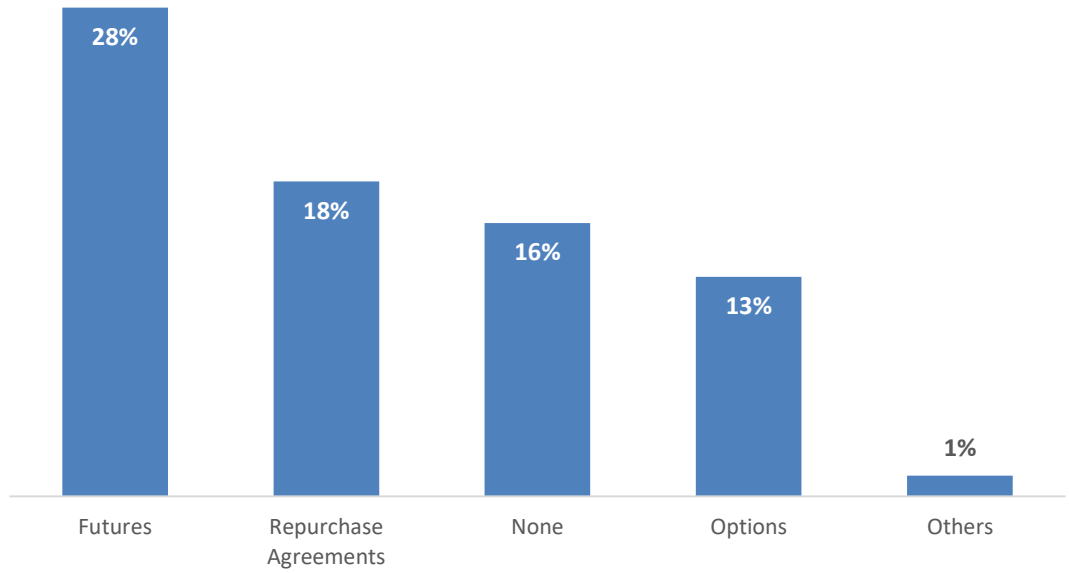

Figure 26: What kinds of carbon financial products are most suitable for early introduction in the national ETS? (n=318)

Apart from CCERs, at least half of respondents expect that credits generated by the Verified Carbon Standard (VCS) or validated by local authorities will also be eligible for providing offset credits in the national carbon market.

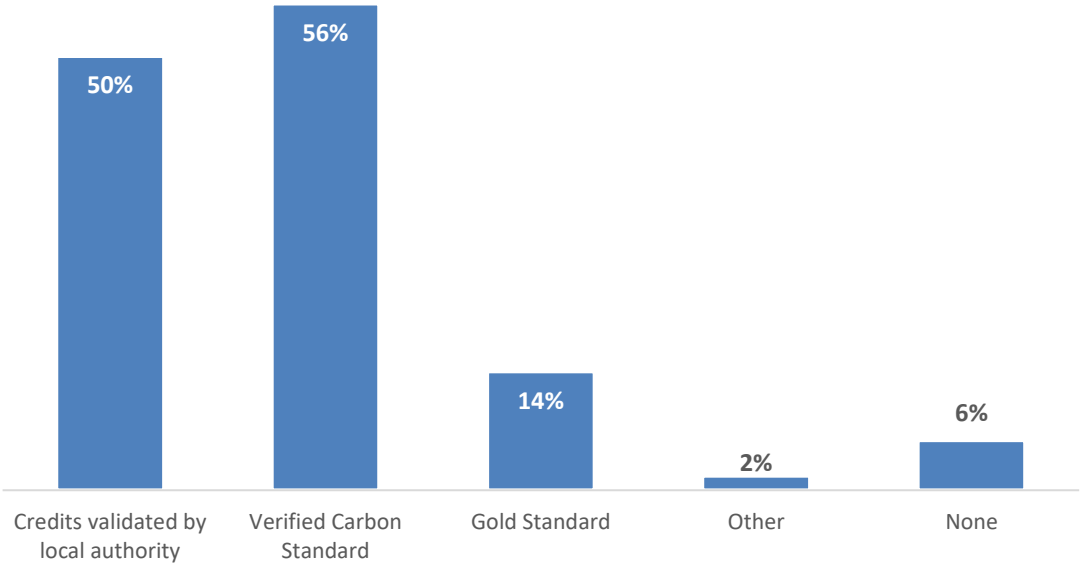

Figure 27: Apart from CCERs, what products do you expect to be eligible for national ETS as offset credits? (select one or more) - % of total respondents (n=352)

Respondents were asked whether they expect any restrictions to be applied to the offset credits utilised within the national carbon market. The most commonly expected restrictions relate to the vintage year of credits, and a limitation on volume or the share of a company's compliance obligation that can be met with offsets. It is worth noting that subsequent to the conducting of the survey, the draft National Carbon Trading Management Measures specified that a maximum of 5% of a company's compliance obligation can be met by CCERs, and that they cannot be generated from emission reduction projects that result from actions taken by covered entities as a result of the national ETS.

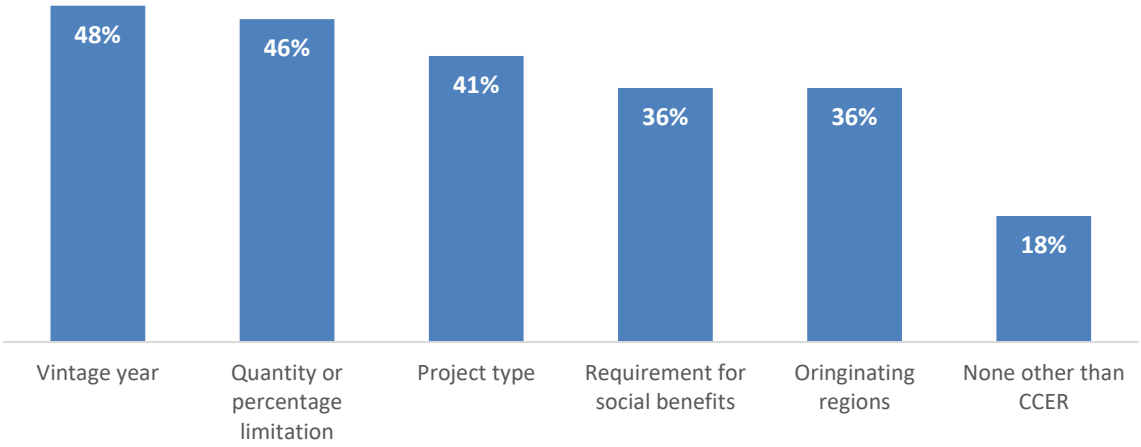

Figure 28: Do you expect any restrictions in the use of offset credits? (n=357)

National ETS-covered entities were asked about their interaction to-date with the registry and exchange platforms. The results suggest that as of November 2021, there existed a substantial gap between the needs of covered entities and the service provision by these key elements of the national ETS infrastructure.

The registry and exchange platforms may require some improvements

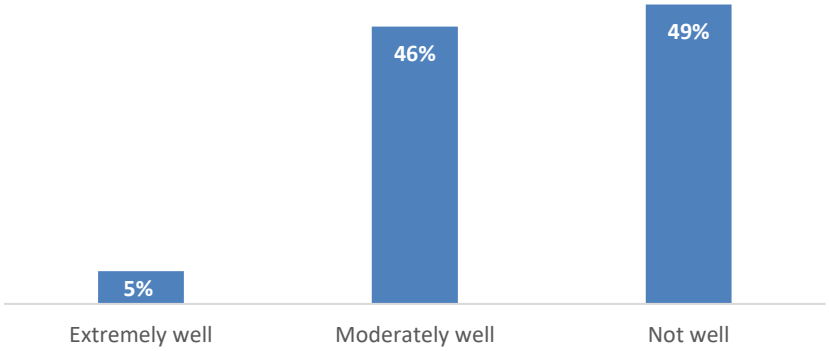

Figure 29: To-date, how would you rate your interaction with the registry platform? (n=167)

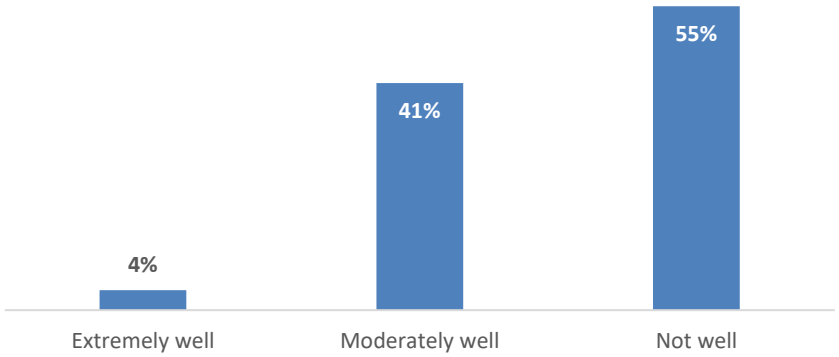

Figure 30: To-date, how would you rate your interaction with the trading platform? (n=165)

The same subset of respondents was asked which period they intend to trade their allowances. Contrary to conventional wisdom, very few respondents suggested that they would be trading very close to the compliance deadline.

Don't wait until the last minute to trade

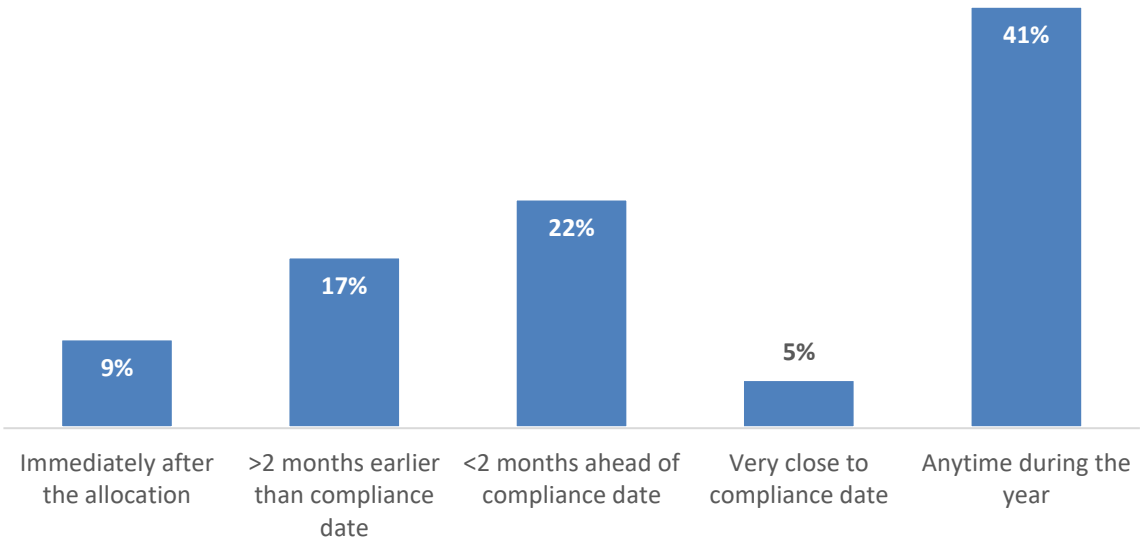

Figure 31: Which period do you intend to trade (sell or buy) your allowances? (n=126)

Prices in the national carbon market

About a third of respondents who expressed a view, said that the price in the national ETS at the time of the survey were similar to what they had expected. There is a divergence in views between covered industry and other respondents, however – a larger share of covered entities says prices are higher than they expected.

Half of emitters think that the price is higher than expected

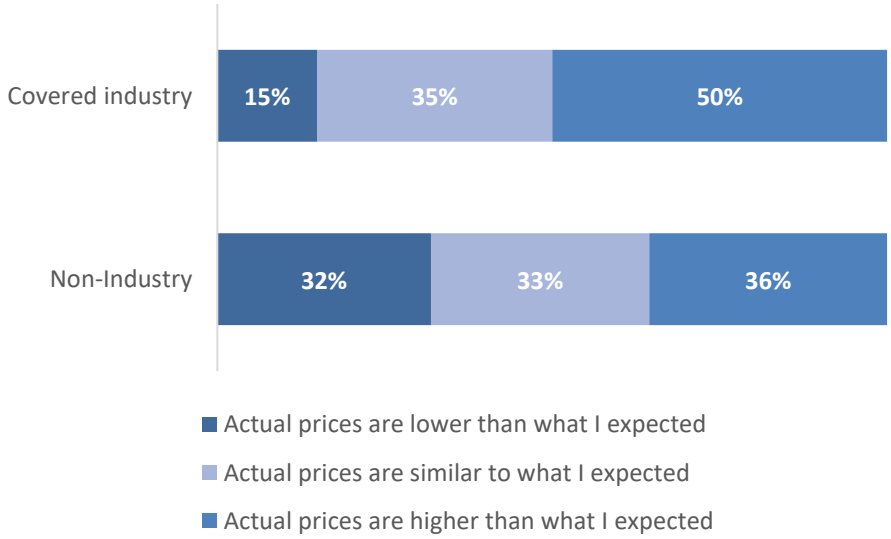

Figure 32: How do the current prices in the national ETS compare with your expectations? (n=346)

Since 2013, this survey has been testing stakeholders' expectations of prices at both the regional and national levels. This year is the first where we can compare previous expectations with a real national price on carbon. The 2020 survey saw an average expectation of CNY 49/tonne CO_2 if the ETS were to start in that year. As it happened, the national ETS came in to force in February 2021 and trading began in July. starting at 48 CNY/tonne and closing at 52.8 CNY/tonne on the opening day, hitting the daily 10% upper limit on price variation.

This year, respondents were again asked what they expect the average carbon price to be at different points in time in the national carbon market in China. The results indicate an expectation of steadily rising prices, but with significant variance over the levels.

The average price expectation in the national market is again expected to be CNY 49/t in 2022, rising to CNY 87/t in 2025 and CNY 139/t by the end of the coming decade (Figure 34). However, the actual price levels remain highly uncertain, increasingly so in the mid-to-long term. The 20th-80th percentile range grows from CNY 30/t to CNY 50/t in 2022 to CNY 50/t to CNY 200/t in 2030.

The authors removed a number of extreme responses, however, there remains a large variance in price expectations provided in this year's survey.[5] The chart below indicates both the average (mean) of expectations, as well as the median. 26% of respondents provided no price estimates (far lower than in recent years).

China's carbon price is expected to steadily rise

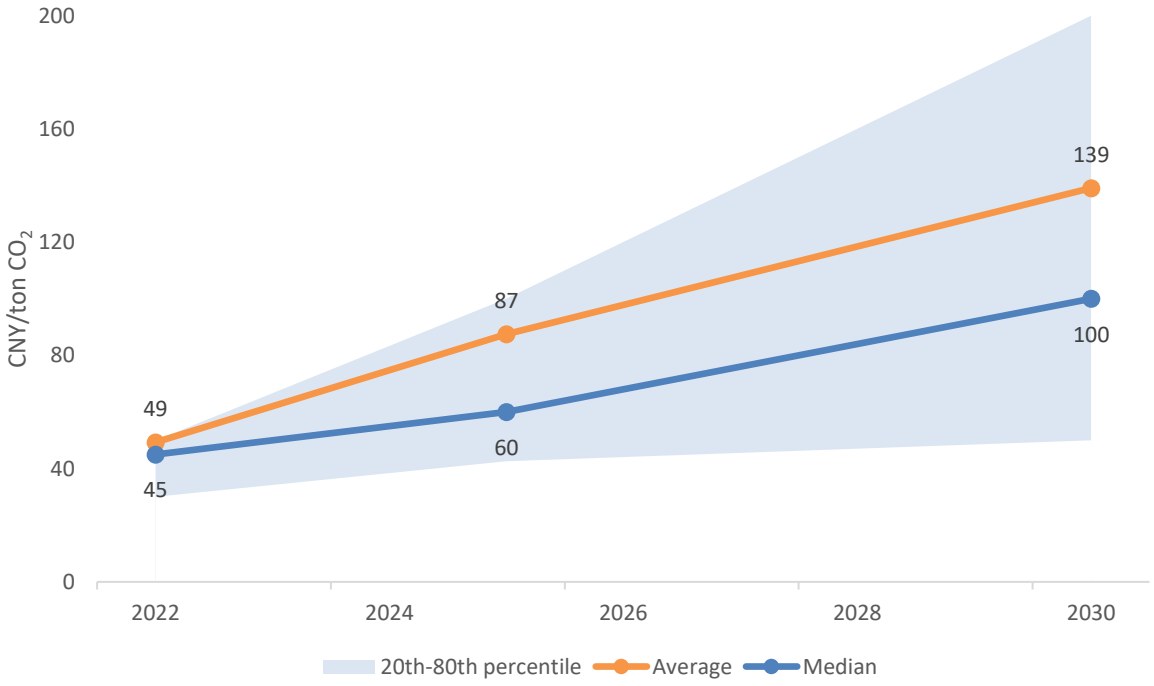

Figure 33: What do you expect the price in the national carbon market to be in the coming years? (n=296,299,290)

[5] The authors removed outlying responses from 11 respondents, defined as 1,000 CNY/ton or above. These were considered to be extreme and therefore not included in the analysis.

The future price expectations for the middle and end of this decade are higher than for those in the previous two surveys.

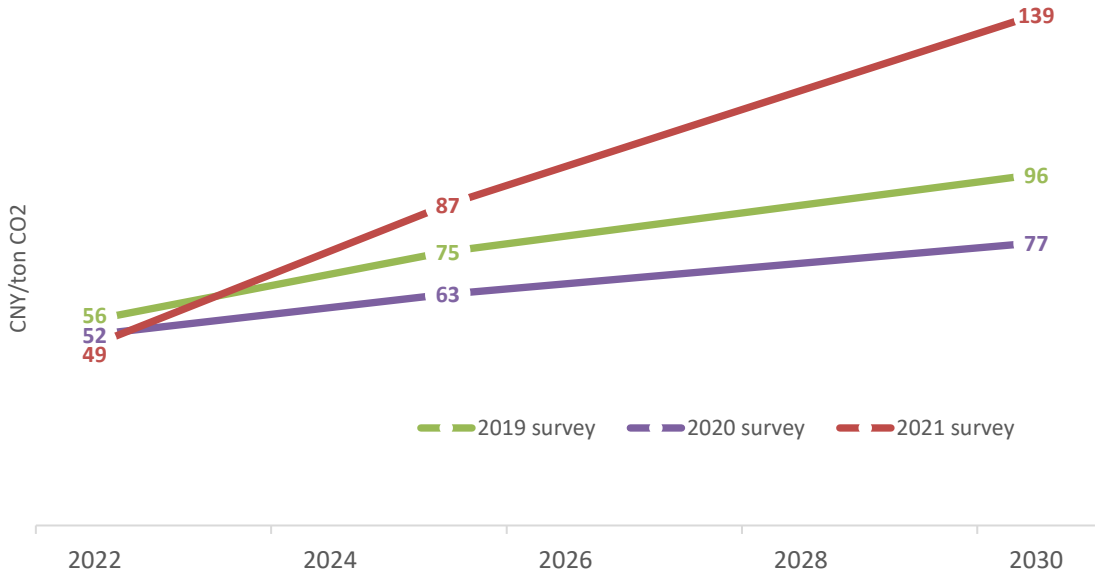

Figure 34: Expectations of the price in the national carbon market, 2021, 2020 and 2019 China Carbon Pricing Surveys.

It is worth noting that the expected carbon price is only a partial indicator of the overall effort to reduce carbon emissions, because the carbon market is complemented by non-pricing policies such as mandatory closure of inefficient facilities, incentives for energy saving, renewable energy feed-in tariffs, etc.

Selected quotes on the price of carbon in the national ETS in coming years:

- The price in 2021 is close to 50 yuan/tonne. By 2025, I expect 30% of emitting enterprises to have a shortage of allowances, which will lead to a higher carbon price. After 2030, China's national ETS will be linked with international carbon markets, so the price in China will be in line with international levels. – *Guizhou market service provider*
- Only a rising carbon price can truly control GHG emissions and phase out high-emitting enterprises, so China can achieve its carbon peaking and neutrality targets. – *Hubei building materials company*
- China's 30/60 climate targets are a tough decision, which comes at a heavy price. The carbon price will rise gradually. However, China's high-quality development path will gradually discourage the development of high energy-consuming enterprises and slow down the contradiction between supply and demand. After carbon peaking in 2030, the prices will then gradually fall back. – *Sichuan non-ferrous metals company*
- With the inclusion of more industries and stricter emission reduction efforts, the allowance gap will gradually widen, and the carbon prices will gradually increase. I think China's carbon price will certainly get close to the EU's 50 Euros. – *Jiangsu steel company*
- Achieving carbon peaking is actually a process of energy saving and consumption reduction for enterprises, and I don't think the carbon price should be too high at first. While making enterprises aware of the urgency, they should also be given some time to invest in energy-saving and consumption-reducing renovations. – *Yunnan power generation company*

For the first time, survey respondents were asked whether they expect that China will specify an absolute emissions target by certain dates. This step has been discussed for some time amongst the expert community and policymakers and would have implications for the design of the national ETS. 48% of respondents said that they expect an absolute target by 2030, while 41% expect this to occur post-2030.

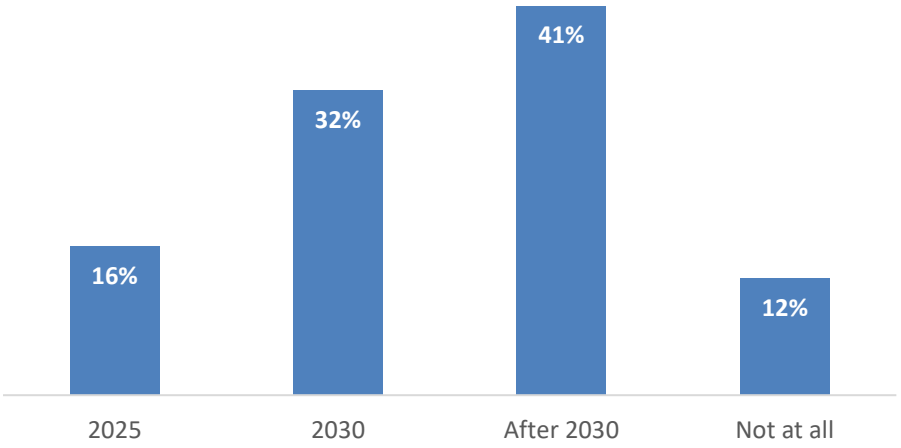

Figure 35: Do you expect that China will specify an absolute emissions target for: (n=387)

Readiness for emissions trading

Respondents from both covered industry and local government were asked how prepared their organisation is to take part in the carbon market. In general, there was a far lower level of preparedness expressed than for survey respondents in the 2020 survey, which is somewhat concerning.

Among the 317 responses from emitting enterprises, the highest level of preparedness was in the areas of 'verification of emissions' (45%) and 'monitoring and reporting emissions' (41%). In last year's results, these two aspects of ETS both had over half of respondents saying that they were established in these areas. 'Allowance and CCER trading' (84%) was outlined as the areas in which companies were least prepared and require further training, similar to last year's results.

Capacity building is needed in many aspects

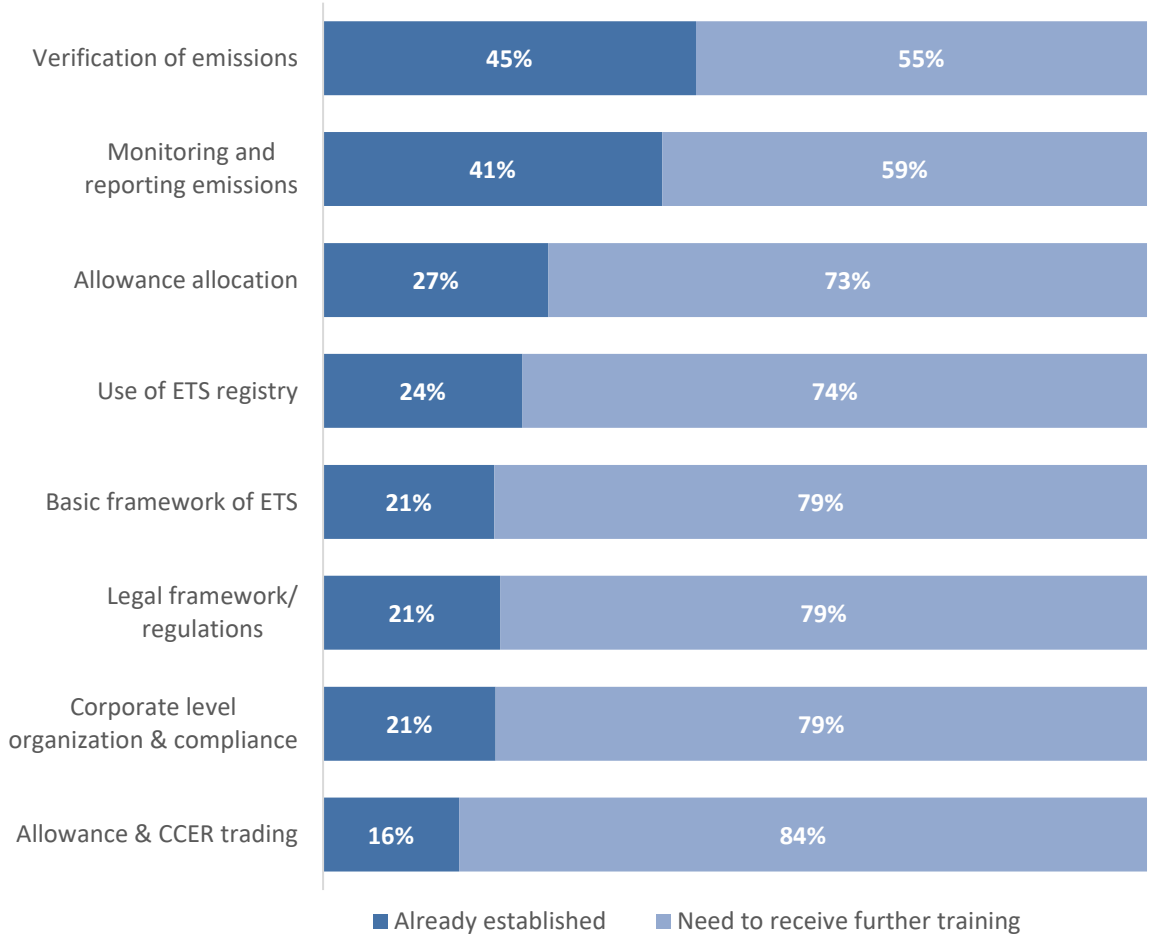

Figure 36: How prepared is your company to perform tasks under an ETS? (n=308,307,306,305,300,291,296,289)

Comparing the responses of companies which have participated in regional pilot carbon markets, versus those who didn't, the survey shows a higher level of preparedness amongst the former. Preparedness for MRV of carbon emissions was roughly even between pilot and non-pilot companies, reflecting the fact that the central government has required companies in ten key emitting sectors countrywide to undergo MRV since 2014.

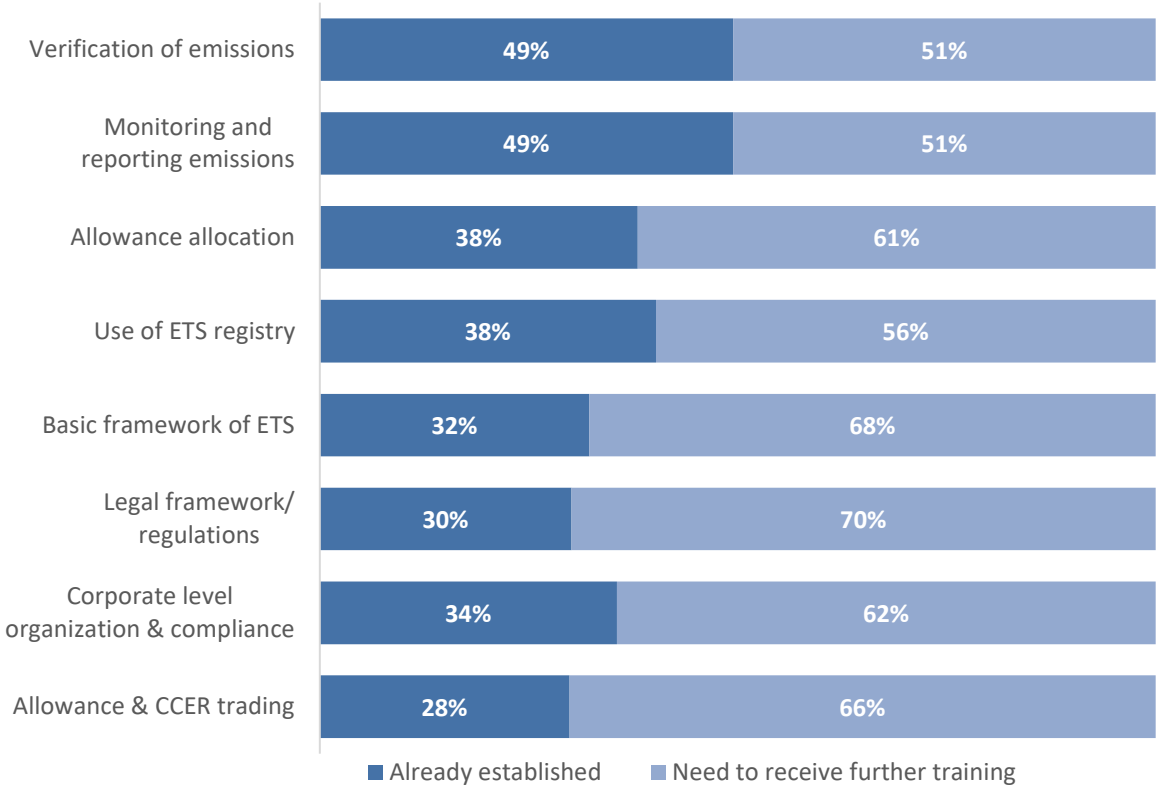

Figure 37: How prepared is your company to perform tasks under an ETS? – Pilot entities (n=93,93,93,93,92,87,90,87)

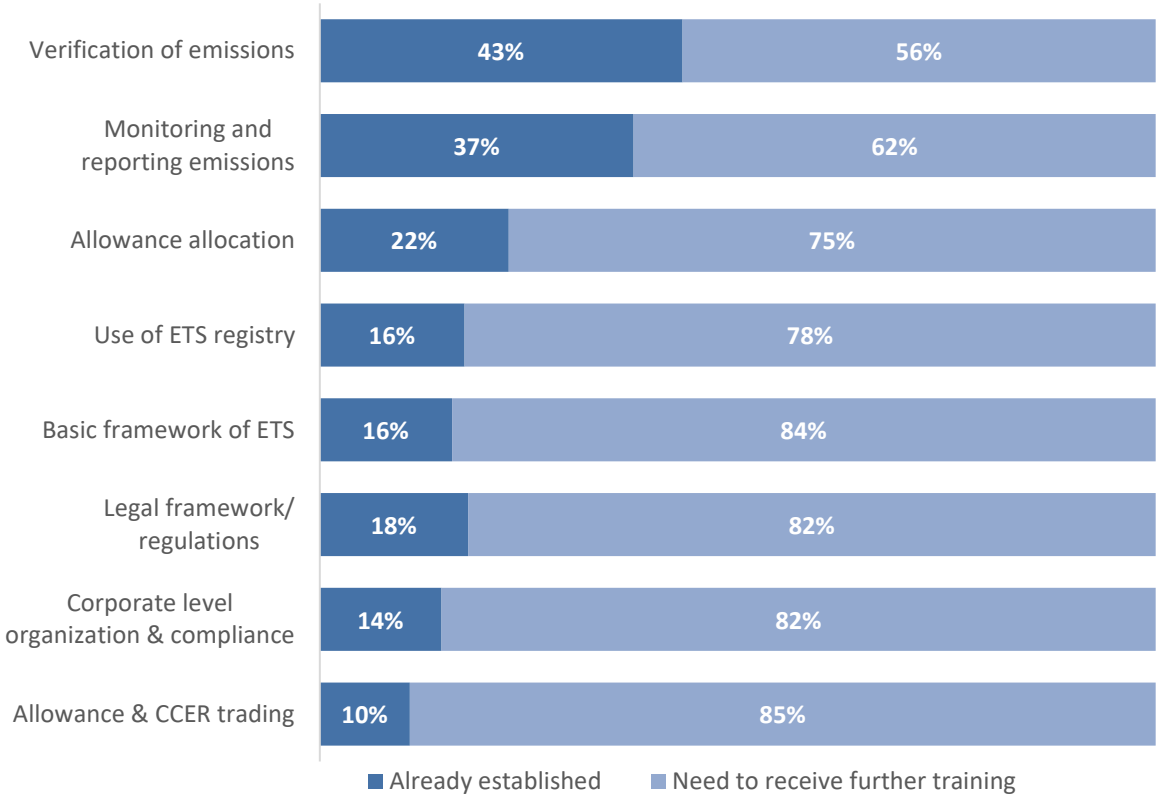

Figure 38: How prepared is your company to perform tasks under an ETS? – Non-pilot entities (n=215,214,213,212,208,204,206,202)

The emitting enterprises were asked whether they had formulated a dedicated team to handle carbon trading obligations. 61% of respondents had dedicated either an individual or a team (up from 52% last year).

Over half of companies have formed a team to handle carbon trading obligations

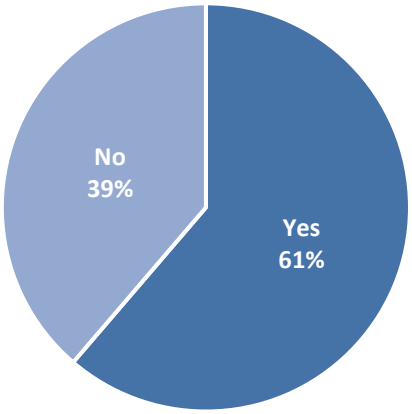

Figure 39: Has your company assigned a dedicated person (internal or external) or formed a dedicated team to handle your carbon trading obligations? (n=297)

Of the companies which have formed teams, about half had a dedicated department, while a further 35% brought together a team made up of representatives from different departments across the company.

Companies have different approaches to ensuring compliance with carbon trading obligations

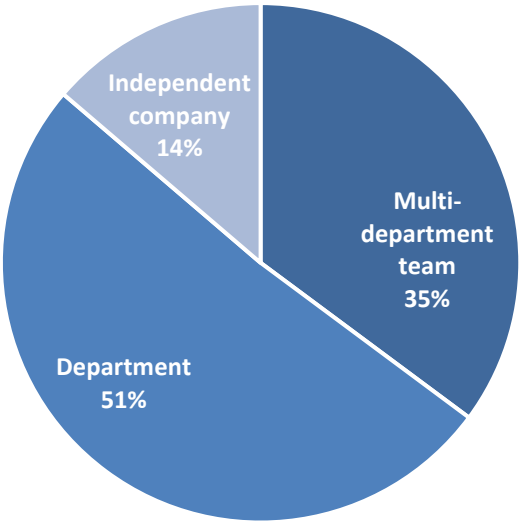

Figure 40: What is your team's organizational form? (n=182)

For the industry respondents who have a team dedicated to handling carbon trading obligations, the vast majority have teams of less than 10 people, with the average team consisting of 4.4 people, up from 3.7 in last year's survey. The numbers vary significantly between industries, which is understandable given the different company sizes, and the fact that the power sector has developed more experience with carbon markets, including the previous CDM. Companies in some of the sectors to be covered later in the national carbon market indicate that they assign people part-time to take responsibility for carbon emission management. The results do not suggest that companies with small teams are understaffed. Even large

compliance firms can manage with teams of five or less dedicated professional staff for MRV and allocation purposes.

Most companies have small teams to deal with carbon trading obligations

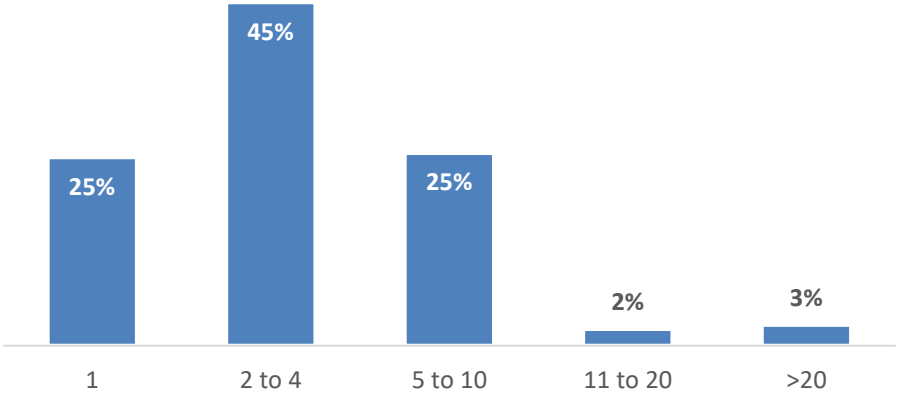

Figure 41: How many people are in the team? – Industry respondents (n=127)

In terms of the make-up of companies' carbon trading compliance teams, the best represented expertise relates to 'safety and environment', 'management' and 'energy saving'. Financial experts and engineers are relatively under-represented.

Carbon trading compliance teams include environment, management and energy saving staff

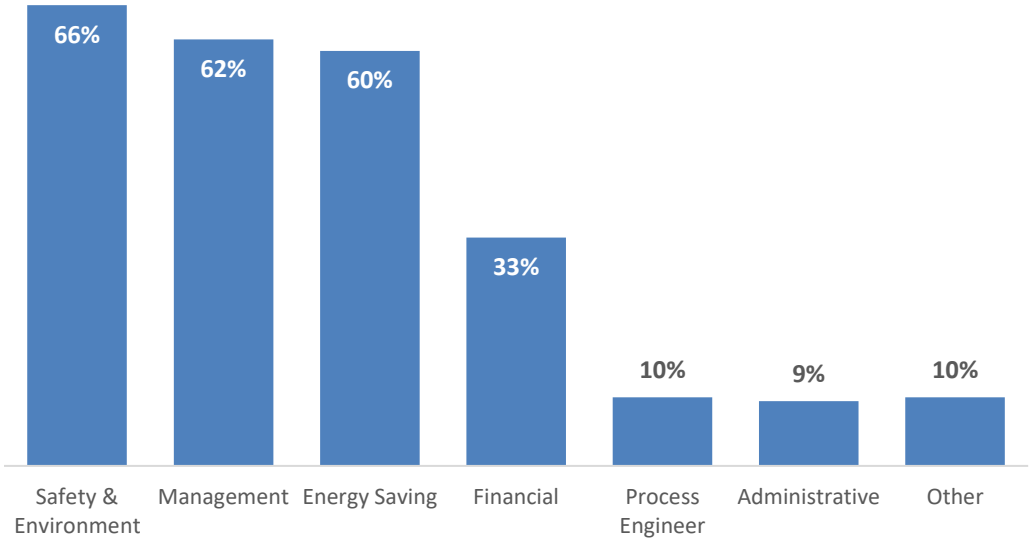

Figure 42: What are the competencies of the person(s) you have assigned to handle carbon trading obligations? (n=182)

70% of industry respondents said they had participated in trainings on carbon trading, lower than last year (81%). Capacity building cooperation through bilateral projects and NGOs have contributed to this. As an example, under the EU-China ETS Cooperation Platform, demand-driven trainings for more than 8,000 local government and over 5,000 industry representatives across almost all provinces and in many sub-provincial jurisdictions have successfully delivered between October 2017 and December 2021. In addition, 17 large-scale trainings organized by MEE in late 2019 with support from several international cooperation programmes, included approximately 4,600 participants, with about two thirds being industry representatives.

A majority of respondents have participated in trainings

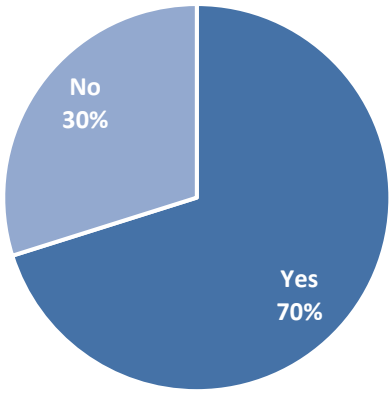

Figure 43: Has your company participated in training(s) on carbon trading? (n=278)

28% responded that their company had developed a compliance strategy for ETS in China (up from 20% in 2020). 'Emission reduction measures' was the most frequently selected approach.

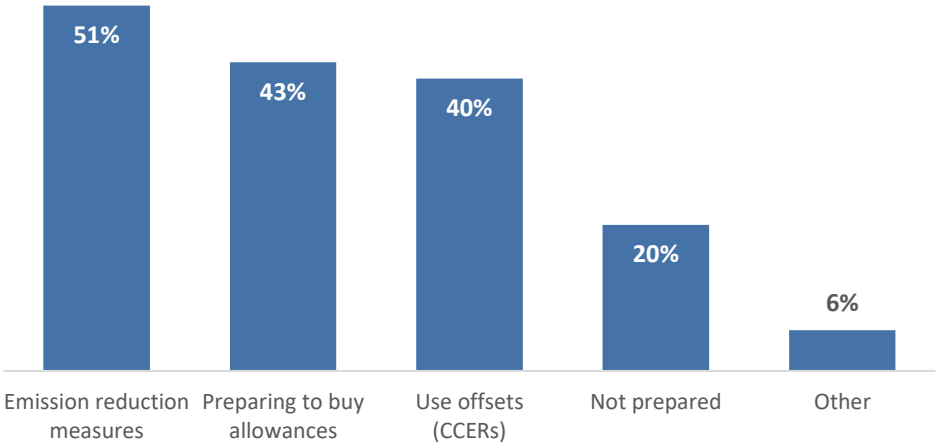

Figure 44: Has your company formulated a compliance strategy for ETS in China? If Yes: How do you plan to be in compliance? (n=138)

Of the emitting enterprises, 68% state that their company has set an internal emission reduction target, significantly up from 43% last year.

More and more companies have set internal emission reduction targets

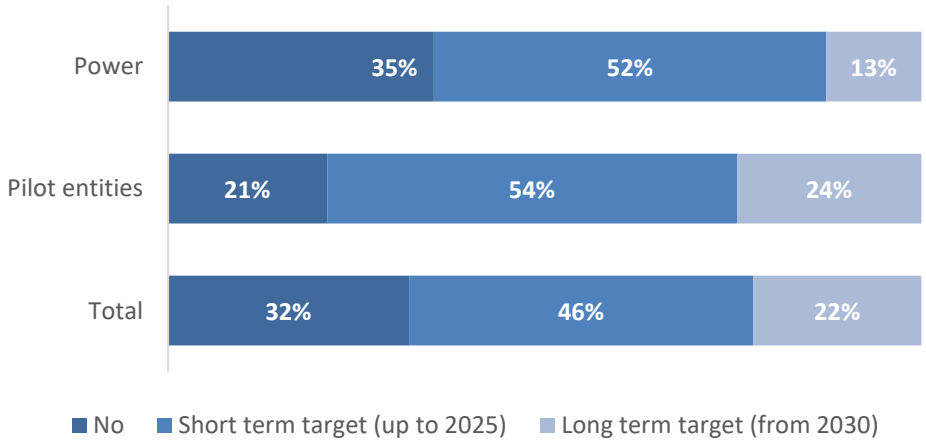

Figure 45: Does your company have an emissions reduction target? (n=278)

13% of emitting enterprise respondents who were aware of their company's approach indicated that they had implemented an internal carbon price, up from 10% last year. For companies covered by regional pilots, the share with an internal carbon price is 22%. A full third of industry respondents were unsure if their companies had implemented such a measure, similar to last year's survey. Internal prices averaged CNY 59/tonne, up from CNY 37/tonne last year. While there were few responses to this question (only 14), it suggests that some companies are setting internal carbon prices above the current spot prices in China's national ETS and most of the regional carbon markets.

Respondents at Group level of major companies were asked whether their company had undertaken internal distribution of allowances between subsidiary companies. Only a minority of these companies had undertaken such re-allocation measures.

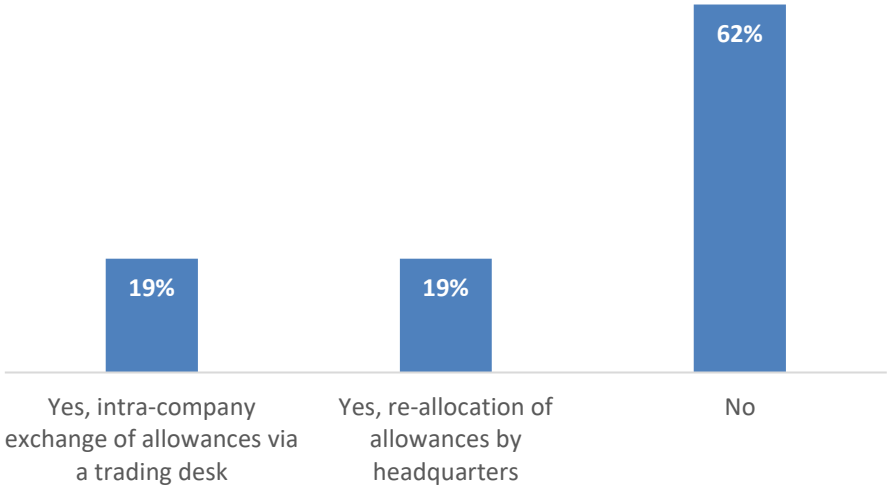

Figure 46: Has your company undertaken internal distribution of allowances between subsidiary companies? (for Group-level respondents) (n=68)

Power sector respondents were asked about their company's situation during the first compliance phase of the national carbon market regarding allowance allocation. Almost half suggested that they would have allowances surplus to their compliance needs (up from 25% in last year's survey).

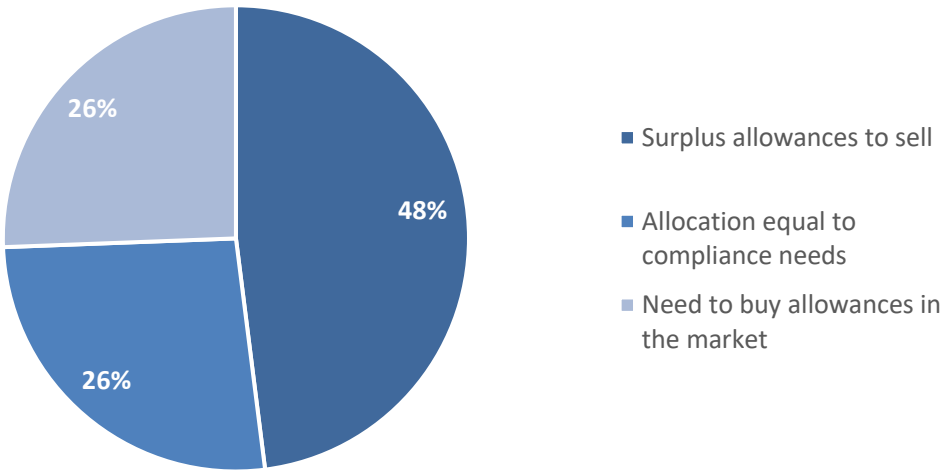

Figure 47: What do you expect your company's situation to be in the first compliance phase of the national ETS regarding allowance allocation? (n=125)

Given the attention generated by China's national carbon neutrality by 2060 target, emitting enterprises were asked whether the target would impact on their company's carbon management strategy. A large majority of industry agreed that it would.

The 2060 carbon neutrality target has impacted on carbon management strategies

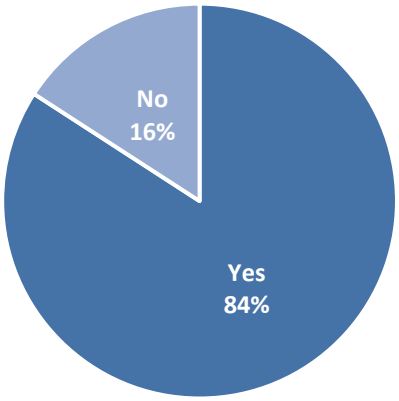

Figure 48: Will China's carbon neutrality target impact on your company's carbon management strategy? (n = 227)

Quotes on how China's carbon neutrality target will impact on carbon management strategies:

- While pursuing productivity of the enterprise, we will improve production processes, implement carbon emission reduction measures, and help the country to achieve the carbon peak as soon as possible. – *Inner Mongolia power generation company*
- Re-assess the status of the industry, pay attention to and raise awareness in relation to carbon reduction work. – *Sichuan building materials company*
- Actively participate in the achievement of emission reduction targets, by increasing investment in system upgrades and transformation. – *Inner Mongolia power generation company*
- Optimise product development, retrofit equipment, energy saving and emission reduction measures, etc. – *Fujian building materials company*
- Small units have limited capacity for development and may be shut down in accordance with government policy. – *Inner Mongolia power generation company*
- Determine the pace of implementation, future risks and direction for development – *Jiangsu steel company*

Quotes on other preparations needed in order to be ready for participation in the ETS:

- Further improvements are needed in terms of capacity and risk prevention and control. – *Beijing-based power generation company*
- It is important that the company's leaders understand the ETS and take this work seriously. – *Jiangsu power generation company*
- Take stock of the enterprise's historical emissions, communicate with relevant authorities on allowances, identify gaps and develop measures to promote emissions reduction. – *Henan non-ferrous metals company*
- The various accounting standards need to be updated, and the integration of green certificates and green electricity must be realised. – *Shanghai petrochemicals company*

Impacts of carbon pricing on investment

Respondents were asked if they expected the price of carbon to affect investment decisions in 2021, 2025, 2030 and 2050. Respondents expect the effect of carbon pricing on investment decisions to greatly increase between the time of the survey and the end of this decade. By 2025, about 4 out of every 5 respondents who expressed a view expect investment decisions to be at least moderately affected. Only 6% of respondents who answered this question expect investment decisions to be unaffected by 2025.

There is confidence that the carbon market will affect investment decisions by 2025

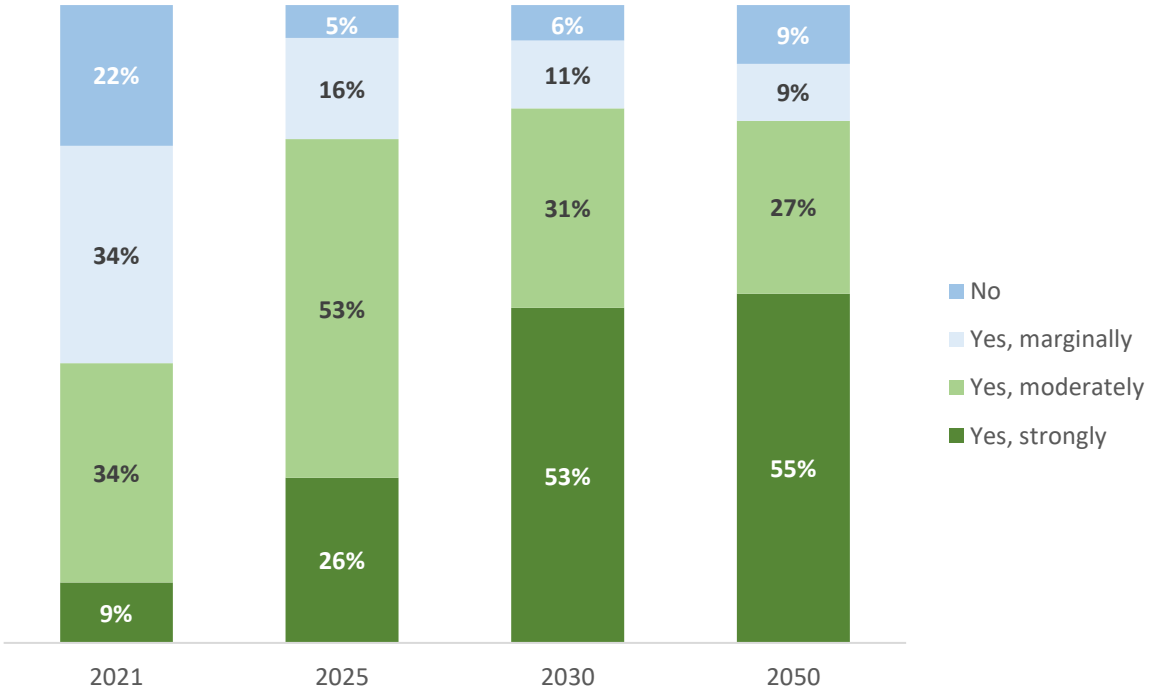

Figure 49: Do you expect the ETS in China to affect investment decisions in 2021, 2025, 2030, 2050? (n=390,390,377,347)

The expectation of carbon pricing's impact in the coming few years is increased from last year, perhaps reflecting greater confidence in the market direction now that trading has started in the national system.

Selected quotes on how the ETS is expected to affect investment decisions:

- China's national ETS will affect the implementation of our company's energy planning. During the period 2021-2025, we will gradually undertake the energy transition, and from 2025-2030 we will start to develop the new energy transition, phasing out larger carbon emitters and moving towards clean energy development. Will complete the transformation and achieve smooth operational development between 2030-2050. – *Yunnan power generation company*
- ETS requires companies to, in accordance with the relevant policies, make technological upgrades in order to increase utilisation of clean energy, to improve the efficiency and proportion of clean energy use, to develop and utilise low-carbon raw materials, to reduce carbon emissions from production processes, and to produce low-carbon products. All of these require the company to continuously transform and upgrade in line with industry trends. – *Shandong building materials company*
- It can promote enterprises' investment in energy saving and change management strategies. – *Henan non-ferrous metals company*

Unlike in most other jurisdictions with carbon pricing, China's electricity prices are currently fixed on an annual basis by the central government, with variations by region. This means that power generation companies cannot pass the carbon price on to consumers. Survey respondents were asked by what time they expect the carbon price to affect the price of electricity for consumers. Over a third of respondents believe this will be the case by 2025, while almost a quarter believe that this will only take place after 2030 or not at all.

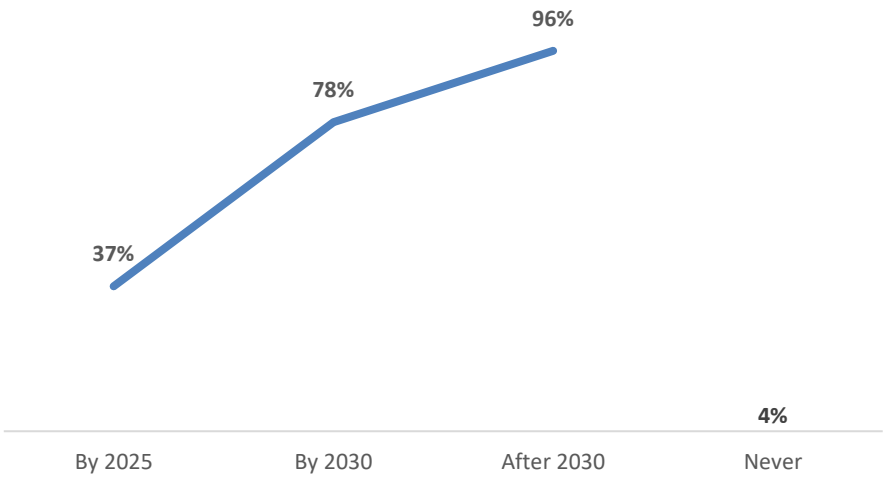

Figure 50: By when do you expect power market reform to allow for carbon price pass through from power producers to end users? (n=372)

Selected quotes on how the national carbon market has so far affected companies financially:

- The current emission intensity of our enterprise is among the lower levels in the industry and the impact now is low. However, as the industry develops, our enterprise will face increasing pressure and the performance of our production and operations will be affected. – *Shandong building materials company*
- Operating difficulties due to rising coal prices, coupled with the need for capital for carbon emissions trading, have led to a decline in the profitability of thermal power units. – *Heilongjiang power company*
- At the initial stage of the national ETS, the relatively generous supply of allowances has had an insignificant impact on our enterprise. – *Beijing-based power generation company*
- In the current situation where power generators are affected by high coal prices together with on-grid electricity prices that face downward pressure, our enterprise is basically in a state of overall loss. Coupled with the relatively poor quality of coal burned, consistently high coal consumption and the fact that the allocated allowances are less than actual emissions, purchasing allowances from the market has serious implications for the company's financial position. – *Yunnan power generation company*

Peak emissions

In September 2020, President Xi Jinping increased China's climate ambition by committing to peak its emissions of carbon dioxide from energy consumption 'before 2030' (instead of 'around 2030'). 85% of respondents to this year's expect China to achieve the carbon emissions peak before, or no later than, 2030. Only 15% expect China's emissions to peak by 2025 or earlier, down from 36% in last year's survey.

China is expected to meet its target of peaking emissions before 2030

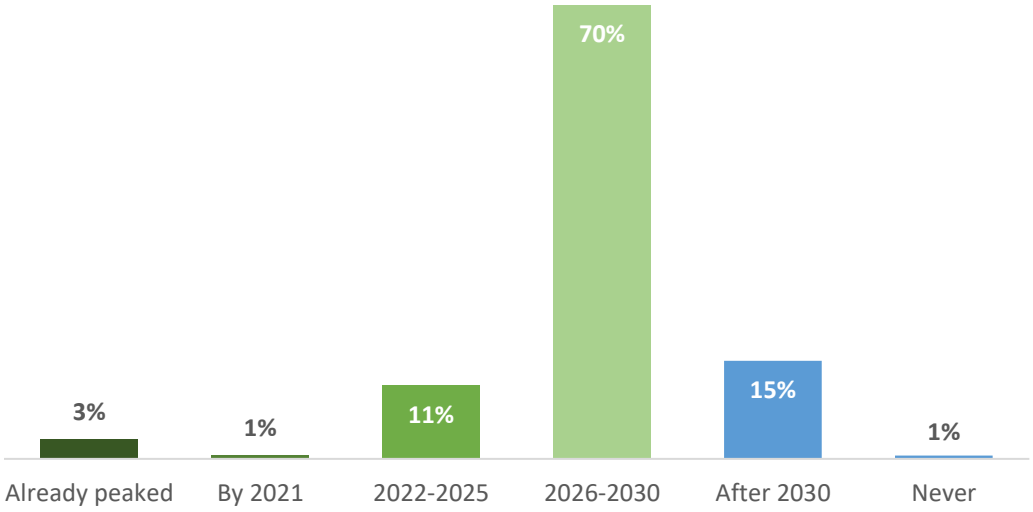

Figure 51: When do you expect China's emissions will peak? (n=399)

Carbon border adjustments

As climate change mitigation ambition increase globally, and the world is seeing rising carbon prices, especially in the European Union, there is increasing attention on the challenge of limiting carbon leakage. Avoiding carbon leakage is not solely a local economic concern, but also of relevance to the global decarbonisation agenda, because if emission reductions in some areas are offset by increases in others it will slow progress towards net-zero.

This year's survey respondents were asked whether they exported to the EU, which is planning to introduce a Carbon Border Adjustment Mechanism (CBAM), and if so, how well they understand the proposed measure and its implications for their industry.

20 respondents indicated that their companies are exporters from China to the EU, and only 30% of these said that they understood the CBAM moderately or very well.

Europe's proposed Carbon Border Adjustment Mechanism (CBAM) is not yet well understood

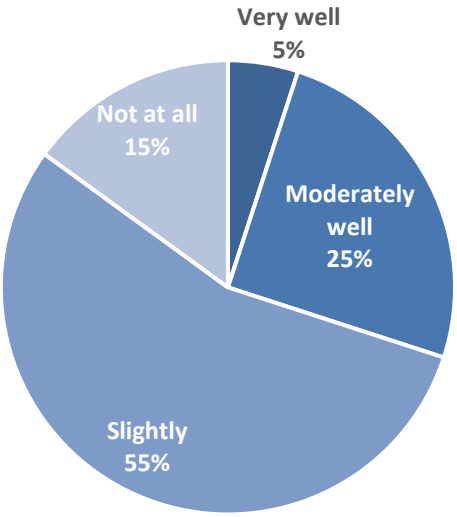

Figure 52: How well do you understand the EU's proposed CBAM (and its implications for your industry)? (n=20)

60% of the exporters to the EU expected that the CBAM will impact on their exports, while a quarter were unsure.

Exporters are concerned that the CBAM will impact their business

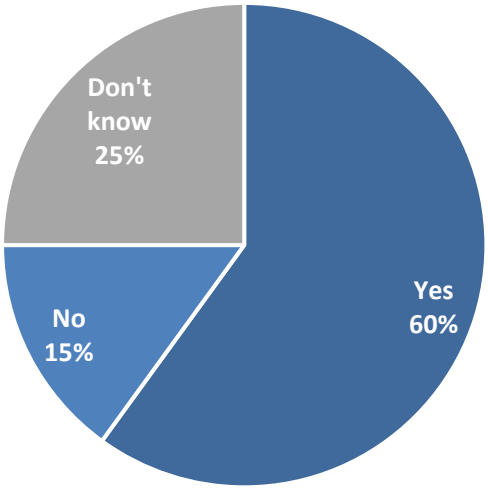

Figure 53: Do you anticipate that the CBAM will impact your exports to Europe? (n=20)

Case Study

Since 2018, the China Carbon Pricing Survey team has cooperated with industry associations in order to achieve better representation of the views of those working in sectors covered or likely to be covered by carbon pricing. During this year's project, a member of the China Nonferrous Metals Industry Association decided to disseminate the survey very widely across the company. As a result, the survey team received a total of 7,134 responses specifically as a result of the company's effort.

Given the extremely wide variation in knowledge of carbon emissions and carbon pricing across the company, many of the respondents simply answered 'Don't know' to the more technical questions. In addition, are large number of responses can reasonably be determined to be unreliable. Still, given the unparalleled dataset that has been developed, we have extracted some selected results.

For example, three quarters of the 817 that provided a view, expect that China's carbon neutrality target impact on the company's carbon management strategy. This is somewhat less than the average for other respondents (84%).

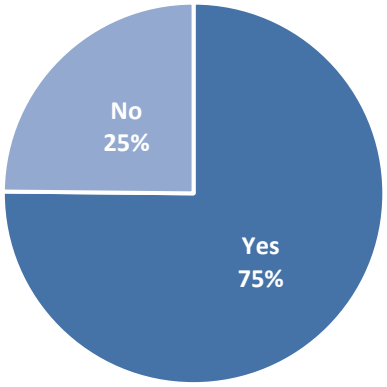

Figure 54: Will China's carbon neutrality target impact on your company's carbon management strategy? (n = 817)

Similarly, while the enterprise's employees expect a rising impact over time of carbon pricing on the company's investment decisions, it is at a far lower level than for the average of views from other respondents.

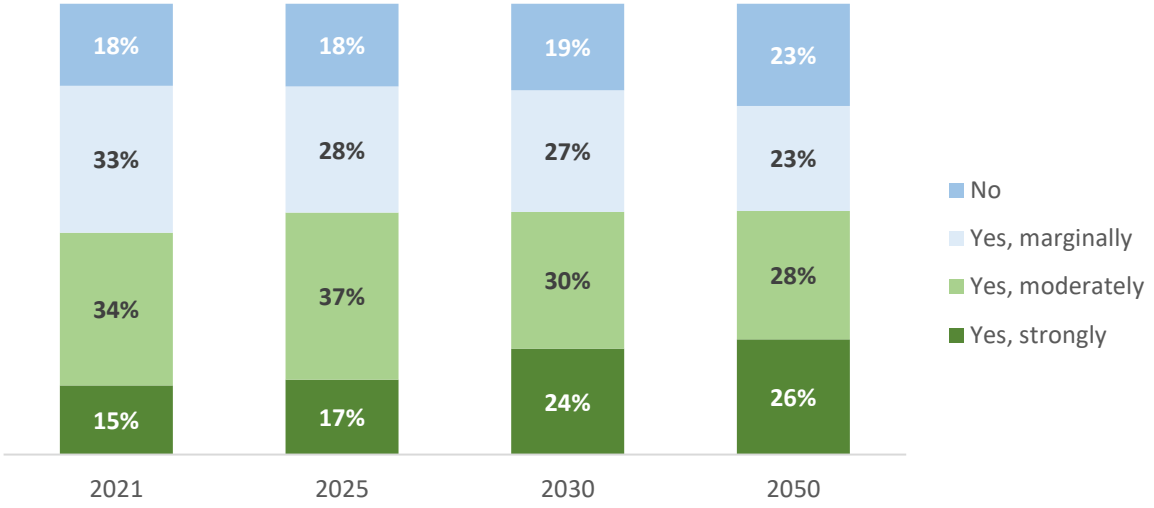

Figure 55: Do you expect the ETS in China to affect investment decisions in 2020, 2025, 2030, 2050? (n=1956,1706,1706,1615)

455 respondents identified their company as an exporter of products to Europe. Of those with a view, 52% expected that the CBAM will impact the company's exports, similar to the overall average of the survey.

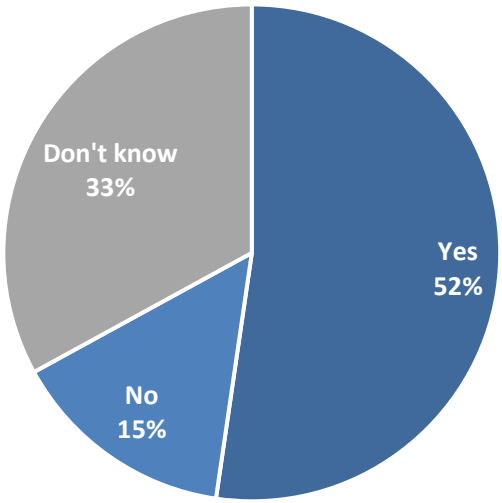

Figure 56: Do you anticipate that the CBAM will impact your exports to Europe? (n=305)

Appendix 1: Key policies issued for the carbon trading pilots in 2020-21

Shenzhen	✓ The number of covered entities in 2020 is 687. ✓ In terms of policies, Shenzhen promulgated the *Regulations of Shenzhen Special Economic Zone on Ecological Environment Protection* in Jul. 2021, which came into effect on Sep. 1, 2021. ✓ Shenzhen Administration for Market Regulation released an announcement in Apr. 2021 to put on record for the new inspectors and institutions that need to be re-filed in 2021.
Beijing	✓ The number of covered entities in 2020 is 859, and another 570 entities are required to submit the report. ✓ In Jun. 21, 2021, Beijing officially released the three standards of the *Guidelines for Electronic Information Products Carbon Footprint Accounting* (DB11/T 1860-2021), *Implementation Guidelines for Carbon Neutrality of Enterprises and Institutions* (DB11/T 1861-2021), *Implementation Guidelines for Carbon Neutrality of Large-scale Event* (DB11/T 1862-2021), and above-mentioned standards came into effect on Oct. 1, 2021. ✓ Adjustment of the allocation method: the allocation method of cement production, heat power production and supply, data center and other industries has been adjusted to the benchmark value method according to the requirements of Beijing on total carbon emission control. ✓ Coal-fired units included in the national carbon market report will participate in the compliance work of the national carbon market from 2022. ✓ The historical base year is adjusted to 2016-2018; the emission control coefficient of each industry is subdivided; the "accounting period" of new emission facilities is adjusted to be put into operation after January 1, 2019. And the allocation verification requirements and application material of new emission facilities have changed. (The above does not change the allocation method in essence, but only changes in the data year in the calculation formula.)
Shanghai	✓ The number of covered entities in 2020 is 314. ✓ The cap of 2020 is 105 million tons (including allocated allowances and reserves). ✓ The allocation scheme for 2020 adjusts the ratio of one-time free allowance, only companies using the grandparenting method would receive the free allowance at one time, while those using other methods would receive only 80% of the allocation on first allocation. ✓ The restriction of CCER usage ratio is reduced (CCER projects should be non-hydro projects, and all of their CCERs should be generated after Jan. 1, 2013. The usage ratio of CCER shall not be more than 3% of the annual emission volume of enterprises in 2020 approved after review by Shanghai Municipal Bureau of Ecology and Environment). ✓ Some parameters related to the emission calculations for the power grid and heating industry are adjusted and optimized. ✓ In Aug. 2021, Shanghai pilot held an allowance auction for the first time, which is open to covered entities and institutional investors; in Sep. 2021, the second auction was held, which is only open to entities included in allocation management for bidding.
Guangdong	✓ 245 enterprises were covered in 2020, slightly higher than previous year.

	✓ The cap of 2020 is 465 million tons, among which 438 $MtCO_2e$ are for covered enterprises, 27 $MtCO_2e$ are kept as government reserves for new entrants and market stability. ✓ The allocation method of each industry stays the same as that of previous year. ✓ The proportion of free allowance of the civil aviation industry is improved to 100%.
Tianjin	✓ 112 enterprises were covered in 2020, slightly lower than previous year. ✓ In May 2021, Tianjin market held the first event in 2020 for paid bidding and grant of allowance, which is available to covered entities and institutional investors. In Jun. 2021, Tianjin market held the second event for paid bidding and grant of allowance, which is only available to compliance entities with insufficient allowance.
Hubei	✓ 332 enterprises were covered in 2020, slightly lower than previous year. ✓ The cap of 2020 is 166 million tons, among which 8% of the cap are kept as government reserves for new entrants and market stability. ✓ In Sep. 2021, the first carbon emission pledge loan in the national carbon trading market recorded in the "National Carbon Emission Registration System" landed in Hubei.
Chongqing	✓ The number of covered entities in 2020 is 187, among which 34 entities are marked as to be closed or being subject to whole-year production suspension, and 153 entities are included in this declaration and report. ✓ 28 enterprises are included in the first compliance period of the national carbon market. ✓ In Dec. 2021, Chongqing held the 2020 event for paid bidding for allowance, and the enterprise of whose actual free allowance is less than its actual carbon emission amount can participate in paid grant of allowance.
Fujian	✓ 284 enterprises were covered in 2020 (excluding the enterprises in the power sector of the national carbon market), and the total allowance cleared and settled is 126,086,120 tons. ✓ The allocation method remained unchanged in 2020. ✓ On Dec. 2, 2021, the first provincial-level comprehensive service platform for the carbon market in China was put into operation online in Fujian, with a business volume of 216,000 tons' allowance in an hour.

Table A-1: Key policies issued for the carbon trading pilots in 2020-21

Appendix 2: CCER registration and issuance status

As of Dec. 31, 2021, 2,856 CCER projects had been publicized for review and 1,047 had been registered (287 of which had been issued) by and with the NDRC. Among those issued, the certification reports for 254 (representing 52.94 $MtCO_2e$) are publicly available.

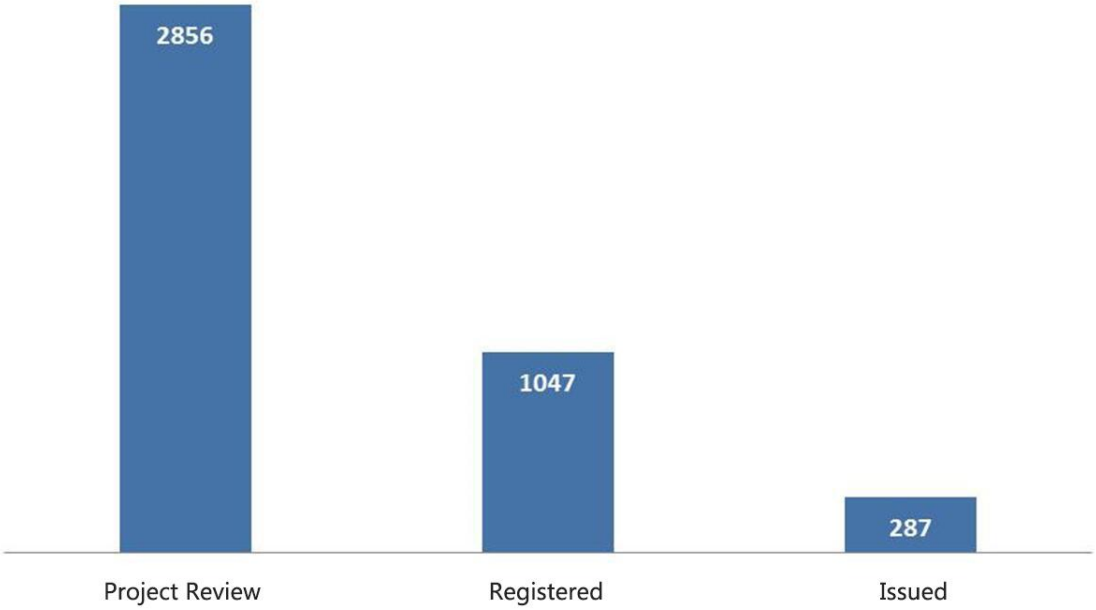

Figure A-1: Number of CCER projects

In terms of project categories, of these 254 projects issued with materials publicized, 139 are Category I [6] (18.9 $MtCO_2e$), 17 are Category II (3.72 $MtCO_2e$), and 98 are Category III (30.31 $MtCO_2e$).

In terms of project types, wind, small-scale hydro, solar PV and household biogas projects are most popular. In addition, there are biomass generation, cogeneration and forests, etc. The details are displayed in Figures A-2 and A-3.

	Wind	Hydro	Solar PV	Household biogas	Total
Project number	90	32	48	41	254
CCER (10,000 tons)	1,246	1,342	274	629	5,294

Table A-2: CCER projects issued as of Oct. 2020

[6] Category 1 refers to CCER projects developed by adopting the methodology recorded by national authorities. Category 2 refers to those projects which have been approved by the NDRC as CDM projects but are not yet registered with the CDM Executive Board. Category 3 refers to those which have been approved by the NDRC as CDM projects and with emissions reductions issued before registration with the CDM Executive Board. Category 4 refers to those registered with the CDM Executive Board but for which the CDM Executive Board has not issued any emissions reductions.

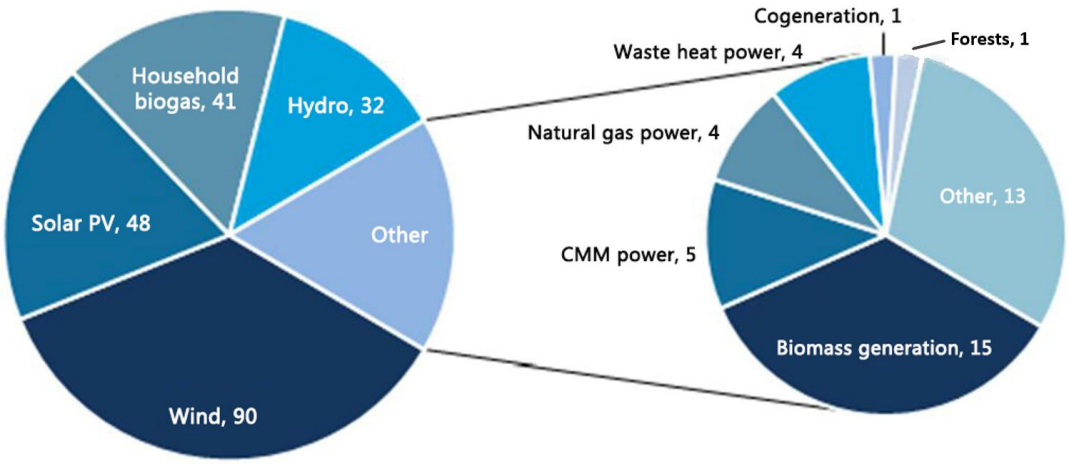

Figure A-2: CCER projects by category (number of projects)

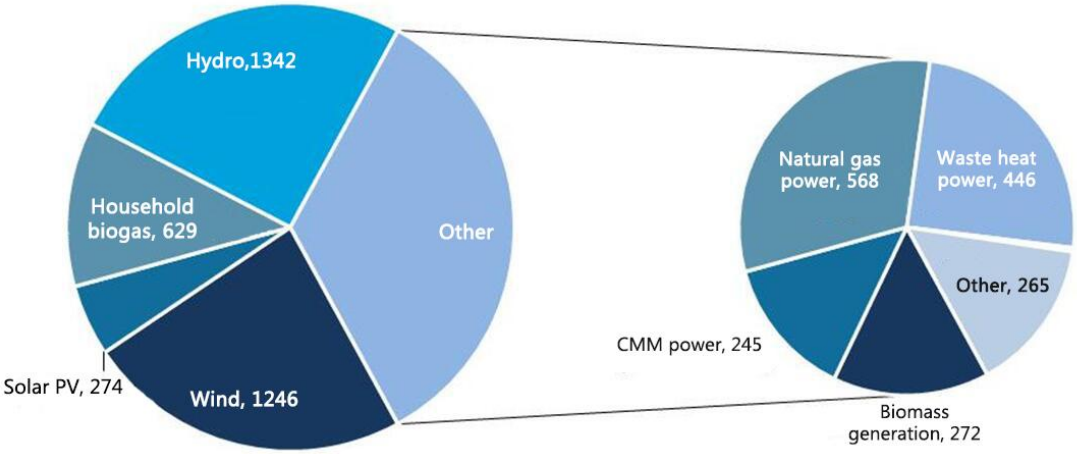

Figure A-3: CCER distribution (10,000 tons)

Project partners

ICF is recognised as a leading global provider of climate change and low carbon related services. The firm has offices and energy/climate experts in the U.K., China, India, Nepal, Europe and North America. ICF has over 1,500 professional employees dedicated to the study of climate change, energy, and environmental issues. ICF's Beijing office, brings in-depth knowledge of the key energy, environment, economic, and policy issues in China with a 20-year plus track record of continuous climate policy capacity building in China and an extensive network of partners and relevant stakeholders. ICF was awarded the best Advisory/Consultancy in China Carbon Markets by Environmental Finance Magazine in the "Annual Market Rankings" for two years in a row (2017 and 2018).

SinoCarbon Innovation & Investment Co., Ltd. (SinoCarbon), founded in July 2010, is a leading comprehensive carbon neutral service provider headquartered in Beijing, with over 300 employees and over 15 regional offices. SinoCarbon has one of the most extensive records of being deeply involved in supporting the design and implementation of the national and regional pilot emission trading markets and the national voluntary emission reduction trading (CCER) market. Over the years, SinoCarbon has gained the reputation of a prominent think tank to governments at all levels in China and showed an outstanding capacity to provide one-stop strategic and all area technical consulting to enterprises in various industries, empowering their traditional business with carbon strategy, enhancing their capacity of carbon and energy management either for policy compliance or strategic business purposes.

Project funders

Founded in 1967 and headquartered in New York, Environmental Defense Fund (EDF) is one of the world's leading environmental organizations. EDF has more than 2.5 million members, a staff of nearly 700 professionals, and 12 offices around the world including the United States, China, United Kingdom, and Mexico. Areas that EDF works in include: climate and energy, oceans, ecosystems, health, etc. Since inception, EDF has been guided by principles of science and economics to find practical and lasting solutions to the most serious environmental problems.

Energy Foundation is a professional grantmaking charitable organization registered in California, U.S. It has been working in China since 1999 and is dedicated to China's sustainable energy development. The foundation's China office is registered with the Beijing Municipal Public Security Bureau and supervised by the National Development and Reform Commission of China.

Our vision is to achieve prosperity and a safe climate through sustainable energy. Our mission is to achieve greenhouse gas emissions neutrality, world-class air quality, energy access, and green growth through transforming energy and optimizing economic structure. We deliver the mission by serving as a regrantor, facilitator, and strategic advisor.

As of 2019, Energy Foundation had funded 2,893 projects operated by over 760 grantees in China, with total funding amount over 330 million dollars. Our grantees include leading policy research institutes, academies, industry associations, local energy efficiency institutions, and NGOs in China and abroad, such as the State Council Development Research Center, the Energy Research Institute of the National Development and Reform Commission, the National Center for Climate Change Strategy and International Cooperation, the Chinese Academy of Environmental Planning, the Chinese Academy of Sciences, the Chinese Academy of Social Sciences and Tsinghua University.

The Norwegian Environment Agency is working for a clean and diverse environment. Its primary tasks are to reduce greenhouse gas emissions, manage Norwegian nature, and prevent pollution. It is a government agency under the Ministry of Climate and Environment and has 700 employees at its two offices in Trondheim and Oslo and at the Norwegian Nature Inspectorate's more than sixty local offices. It implements and gives advice on the development of climate and environmental policy. It is professionally independent. This means it acts independently in the individual cases that it decides and when it communicates knowledge and information or gives advice.

2021 CHINA CARBON PRICING SURVEY

Conducted by

ICF

SinoCarbon Innovation Investment
中创碳投
SinoCarbon Innovation & Investment Co., Ltd

Funded by

EDF
ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

ENERGY FOUNDATION
能源基金会

NORWEGIAN ENVIRONMENT AGENCY