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China Carbon Pricing Survey

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Dimitri de Boer
China Carbon Forum

Renato Roldao
ICF International

Huw Slater
China Carbon Forum

Abstract

This report summarises the results of the 2015 China Carbon Pricing Survey. The survey elicited expectations about the future of China's carbon price from stakeholders in carbon markets in China between May and July 2015. The results of the survey give strong confidence that carbon price levels in China will rise over time, and that carbon pricing will increasingly affect investment decisions. Surprisingly, industry respondents expect higher carbon prices than non-industry respondents. China has announced that a national emissions trading scheme will be established by 2017. Many expect that it could take until 2020 or so before the national ETS is fully functional across mainland China. The expectation is that in the coming years until 2025, China's mix of policy instruments to control carbon emissions will markedly shift towards carbon trading, tax, and information disclosure. Although most respondents expect that a carbon tax will eventually be introduced, there is much uncertainty over its timing. There is strong confidence that China will meet its target to peak emissions by 2030. Many expect that the peak in emissions will be reached significantly earlier.

Keywords

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

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Address for correspondence:

Peter Edwards, China Carbon Forum
Address: Zhengjue Hutong no. 5, Xinjiekou, Xicheng District, Beijing CHINA 100035
Phone: +86-13051209659
Email: peteredwards@chinacarbon.info

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Conducted by:

China Carbon Forum (CCF) is a non-profit organisation that provides an independent, neutral platform to engage stakeholders in China's climate change sector. CCF prepares research and organises focused events to discuss climate change issues in specific sectors, including invitation-only networking events, research, and policy consultations to discuss removal of barriers to emissions reductions, and to develop a more climate resilient society.
Contact for CCF: Mr. Peter Edwards, peteredwards@chinacarbon.info

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Contact for ICF: Mr. Renato Roldao, renato.roldao@icfi.com

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Executive summary

This is a summary of results from the *2015 China Carbon Pricing Survey*, jointly conducted by China Carbon Forum (CCF) and ICF International.

The survey, undertaken from late May to early July 2015, elicited expectations about the future of China's carbon price from 304 China-based stakeholders. The survey is a collective "best guess" by these stakeholders. It does not claim to be representative, but it does provide a clear indication of dominant stakeholder views about the likely future of carbon pricing in China. The project builds on a similar survey conducted in 2013 by CCF and the Centre for Climate Economics and Policy (CCEP) at the Australian National University.

This survey report comes at a crucial time of global interest in China's climate action. 2015 is the year of UNFCCC COP 21 in Paris, and it also marks the end of the second compliance year for most of China's pilot emissions trading schemes (ETS), and a national ETS is planned to start in early 2017.

Respondents

The survey received 304 responses from professionals in a range of sectors, including academia and independent research institutes (37%), industry (22%), consultancies (14%), carbon trading companies (9%), and NGOs (7%). Other respondents include those from the financial sector; local and national levels of the Chinese government, foreign governments and multilateral organisations, and legal services. 79% of industry respondents are from sectors intended to be covered by the forthcoming national ETS. Despite strong efforts to reach out to industry, the survey received more responses from non-industry experts. This reflects the fact that carbon pricing is still at a very early stage in China.

The ETS pilots

Prices in the seven pilot schemes have significantly fluctuated. Prices in many schemes temporarily rose following their establishment in 2013 and 2014 (prices in Shenzhen even exceeded 100 RMB/t for a short time in October 2013), but then declined and stabilized throughout late 2014 and early 2015. In May and June 2015 prices in most schemes dropped sharply, largely due to oversupply of allowances. At the time of the survey, prices ranged from 9 RMB/t in Shanghai to 42 RMB/t in Beijing.

When asked how current prices compared to their expectations, most respondents (88%) said that prices in the seven pilot schemes were similar to or lower than their expectations. However, looking forward to 2016, respondents expect prices in the pilot schemes to rebound to between 33 and 55 RMB/t. At this stage, government intervention and regulation is still perceived to be the most important factor influencing price levels in the pilot ETSs.

Industries were asked whether they had formulated a compliance strategy for ETS in China. Even though only 37% of industry respondents said they had formulated such a strategy, 68% of respondents who are currently operating in one of the ETS pilots claim to have a compliance strategy. It appears that the pilots are having a significant impact on corporate strategy.

Very few respondents (1%) indicated that, in their opinion, current ETS design is already quite good. Respondents selected the following areas which require further improvement: 'allocation of allowances', 'level of the cap', 'monitoring and reporting systems', 'accreditation and verification

systems', and 'registry and market oversight'. Overall, it appears a lot of work must still be done to improve ETS design.

National carbon pricing

Even though the Chinese government has announced that a national ETS will be established in early 2017, when asked by when China's national ETS will be fully operational and covering all provinces and regions of mainland China, only 33% expect this to happen by 2018 or earlier. A majority (74%) expect the national ETS to be fully operational and covering all of mainland China by 2020 or earlier.

The average price expectation in the national ETS is RMB 39/t in 2017; RMB 45/t in 2018; RMB 56/t in 2020; and RMB 70/t in 2025. However, the price levels remain highly uncertain, especially in the more distant future. The 20th and 80th percentiles for 2025 are 40 RMB/t and 100 RMB/t respectively.

China's carbon price is expected to steadily rise

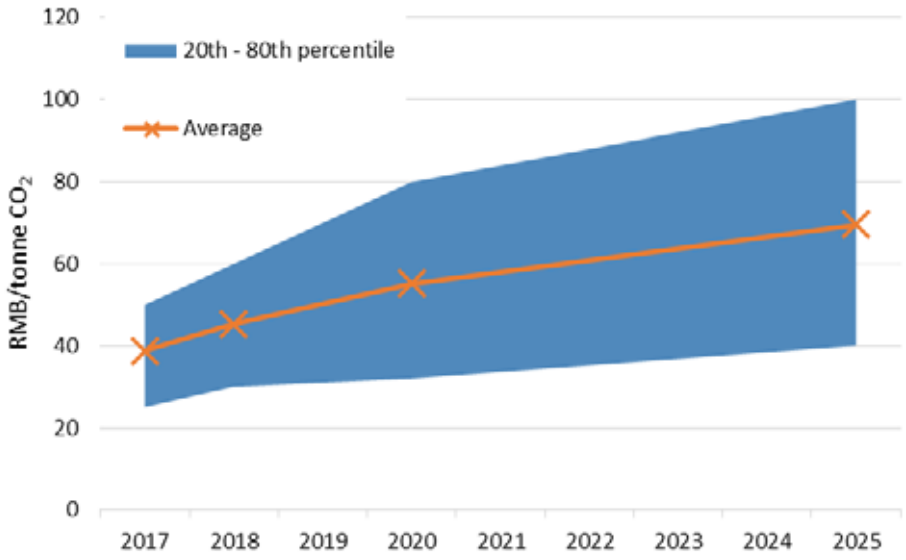

Figure 1 Q5-4 What do you expect the price in the national ETS to be?

Expectations varied somewhat between industry and other respondents, with industry expecting higher prices after 2018. This is surprising – other similar surveys conducted in Europe and Australia tended towards lower carbon price expectations from industry.

63% of government and industry respondents indicated a lack of preparedness for emissions trading. Needs for further capacity building are broad and diverse. Priorities appear to include monitoring, reporting, verification and accreditation (MRVA); carbon finance; corporate compliance strategy; and legal framework and regulation.

Respondents expect carbon pricing to increasingly affect investment decisions in the coming years. In 2016, 36% expect investment decisions to be strongly or moderately affected, and by 2020 this figure rises to 82%.

Carbon pricing is expected to increasingly affect investment decisions

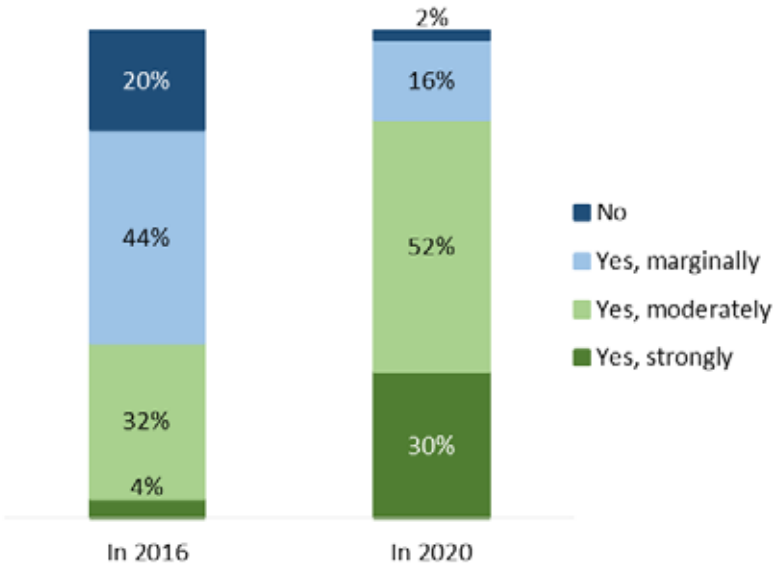

Figure 2 Q3-1 Do you expect the price of carbon in China to affect [your company's/major emitters] investment decisions in 2016? In 2020?

Respondents were asked what they expect will be the most important policies to reduce GHG emissions in China at different points in time (Figure 3). From now until 2025, the combined expectation of respondents is that the emphasis will clearly shift towards ETS, environmental tax, and environmental information disclosure.

ETS, tax and information disclosure are expected to become the main policy instruments

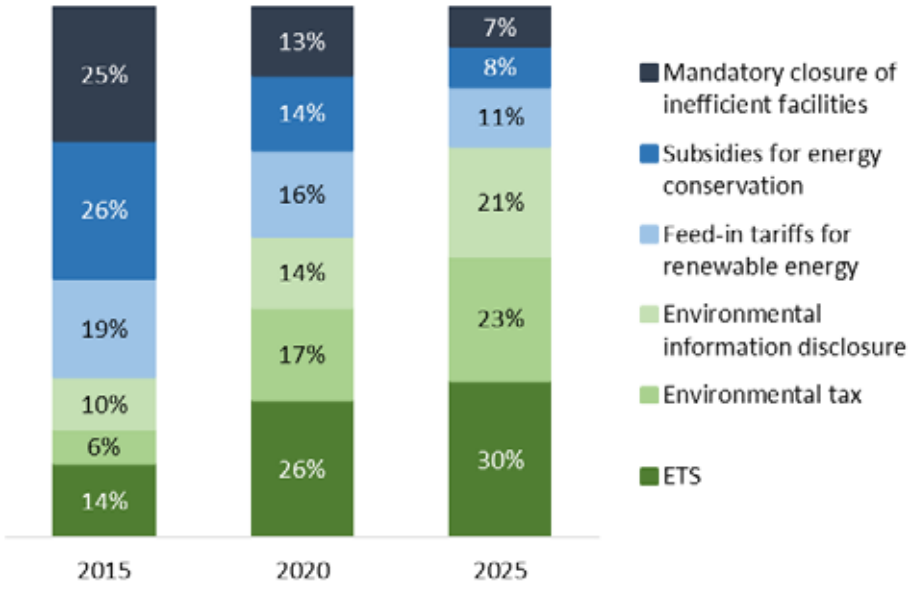

Figure 3 Q6-1 Which do you expect to be the most important policies in motivating companies to reduce GHG emissions in China at different points in time? (please select up to 3 options)

Regarding a possible carbon tax, the majority of respondents (83%) expect that China will eventually introduce a carbon tax. However, there remains much uncertainty as to when such a tax will be

introduced. 45% of respondents expect a carbon tax by 2020, and this figure rises to 65% for 2025. The expectation for a carbon tax being introduced is lower than in 2013. At that time, 67% expected a carbon tax to be in operation by 2020.

Respondents who expect a carbon tax to be in effect provided average estimates of RMB 23/t in 2016, RMB 31/t in 2018, RMB 40/t in 2020, and RMB 50/t in 2025.

When asked if they expect China's national ETS to be linked with other existing schemes around the world, 52% doesn't expect international linking until after 2030. Of those expecting international linkages, around two thirds of respondents expect a link with the EU ETS. The expectations for international linking are much lower than they were in the previous 2013 survey. At the time, almost 70% of respondents expected a link with the EU ETS by 2025. There has been an increasing recognition that international linking between schemes is complex.

China's emissions targets and peak emissions

While 82% of respondents expect that China will stick to an emissions intensity target for 2025, a majority expects that an absolute emissions target will be set for 2030. These results seem to support the possibility that in the coming 5 to 10 years China may shift its 2030 emissions commitment from an emissions intensity target to an absolute emissions target.

There has recently been much speculation over the timing of China's peak in absolute greenhouse gas emissions. China's ambition to peak emissions by 2030 or earlier was announced in a joint statement by Presidents Xi Jinping and Barack Obama, and was formalized in China's 'Intended Nationally Determined Contribution' which was submitted to the UNFCCC in June 2015.

82% of respondents expect China to achieve the carbon emissions peak by 2030, and 39% even expect China's emissions to peak by 2025 or earlier[1].

China's emissions are expected to peak ahead of 2030

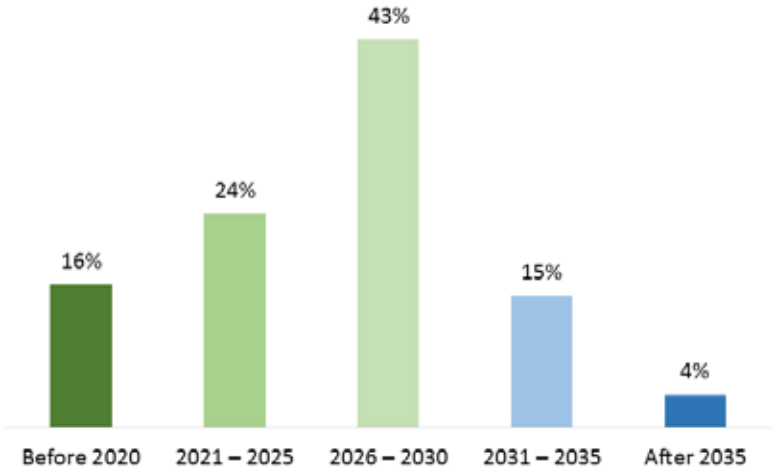

Figure 4 Q7-1 When do you expect China's GHG emissions will peak?

[1] There was some variance among respondent groups. About half of industry respondents (52%) expect the carbon emissions peak to be achieved by 2025 or sooner, compared to 36% of non-industry respondents.

Introduction

This report presents the results from the *2015 China Carbon Pricing Survey*, jointly conducted by China Carbon Forum (CCF), a Beijing‐based organization with the objective to foster trust and cooperation among China's stakeholders for climate action, and ICF International (ICF) a leading global provider of climate change policy expertise.

The project builds on the *2013 China Carbon Pricing Survey*, which was conducted by CCF and the Centre for Climate Economics and Policy (CCEP) at the Australian National University. Many of the questions asked were the same in both surveys, and results were compared over time. Strong efforts were made to survey representatives from China's carbon-intensive industries, which are already subject to, or are soon expected to be subject to carbon pricing.

This survey report comes at a crucial time of global interest in China's climate action. 2015 is the year of the Paris COP 21 of the UNFCCC, and it also marks the end of the second compliance year for most of China's pilot emissions trading schemes (ETS). A national ETS is set to start in early 2017.

Government has committed to specified emission reduction targets, to reduce the nation's carbon intensity of the economy by 40 to 45 percent from 2005 levels by 2020, and by 60 to 65 per cent by 2030.[2]

There have also been official statements about the intention to introduce a national emissions trading scheme in 2017. The seven ETS pilots were designed bottom-up with their own rules to allow experimentation. Since their establishment in 2013 and 2014, the ETS pilots have seen very high compliance rates, and gradually increasing liquidity. Details of the transition to the national ETS are yet to be disclosed, and the price of carbon remains difficult to predict. A carbon tax may also be adopted, but again the timing, design and levels remain uncertain.

The survey gauges expectations by China‐based experts about the future of China's carbon price, and how it will relate to international markets. It quantifies expectations about future prices and policy settings. 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 expert community.

The expectations about future carbon price levels elicited here 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 determine future prices. There is no claim that the survey is representative of the views of all experts on the matter, both because it is not possible to create a representative list of experts, and because of self‐selection of those who chose to respond to the survey. The average expected prices derived from surveys such as this one 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.

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

Surveying China's carbon pricing stakeholders

Those invited to participate in this survey were selected from CCF's database of members and ICF's database of contacts involved in China's carbon markets. The survey was also made available to potential respondents through both CCF and ICF's social media channels. The project team particularly sought responses from those with a known role working on carbon market issues for their organisations, or their known expertise on the subject matter.

The survey was conducted anonymously through a secure online survey platform, *SurveyMonkey*, from May 25 to July 17, 2015[3]. 304 eligible responses were included in the analysis.[4] English language and Chinese language versions were made available.

The 2013 survey was conducted before most of the pilot schemes had begun operation in China, while the 2015 survey reflects the collective view after two years of ETS pilot operation. The number of respondents was much higher in the 2015 survey (304 compared to 86 in 2013), reflecting the growing number of people involved and interested in carbon pricing in China.

The survey does not claim to be representative. However, it covers a significant number of China's expert community on carbon markets, with particularly strong representation from key designers, implementers and participants of China's ETS pilots and a future national ETS, such as academic experts, industry, carbon trading participants and consultancies. As such it provides a reasonable indication of views and expectations among China's carbon market community.

The Appendix to this report shows the exact wording of the survey questions, along with detailed survey statistics and some explanatory notes. Within this report, unless otherwise stated, percentages refer to the proportion of respondents to a particular question. Please refer to the Appendix to see the number of non-responses for each question.

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[3] Emails were sent to respondents to the 2013 survey (70 of 86); an additional range of subjectively selected members from the CCF database (465), prioritising industry participants, sectoral associations, and government representatives with a known or expected involvement with emissions trading; a selected group of experts, approached personally by Dr Liu Yu, Associate Professor at the Institute of Policy and Management, Chinese Academy of Sciences, who acted as a consultant on this project (60); and selected persons in ICF's database, prioritising those related with any of the six sectors expected to be covered at the beginning of the national ETS and those stakeholders/participants that have been actively taking part in China's ETS training and capacity building related activities coordinated by ICF (approximately 800). Follow-up phone calls were made and reminders were sent to those that were invited to answer the survey but were either not responding or had just partially completed the survey. The survey was also distributed through to CCF and ICF professional networks via WeChat, LinkedIn and Facebook. In total, 153 respondents replied directly to email invitations, while 151 respondents accessed the survey via web links provided via social media. No responses were included from organisations involved in implementing or funding this project.

[4] 53 responses were excluded, because they were either very incomplete or duplicate.

Survey respondents by groups

Of the 304 respondents, 37% self-identified as being affiliated with academia and independent research institutes. These respondents have typically been involved in advising local and national governments on the establishment of ETS pilots as well as preparation for a national ETS. 22% of respondents are from industry, with the highest representation from chemical and petrochemical as well as the power and heat production sectors. 79% of all industry respondents are from sectors intended to be covered by the forthcoming national ETS.[1] 14% are representatives of consultancies whose work relates to carbon pricing; 9% respondents work in carbon trading; 7% work for NGOs; 4% are from the financial sector; 2% from each of local and national levels of the Chinese government; 1% each from foreign governments and multilateral organisations; and 0.3% working in legal services. Despite the apparently low share of industry respondents, the survey received a total of 70 such responses, which is the largest number of industries that have been surveyed on carbon prices in China to date.

Survey respondents by group

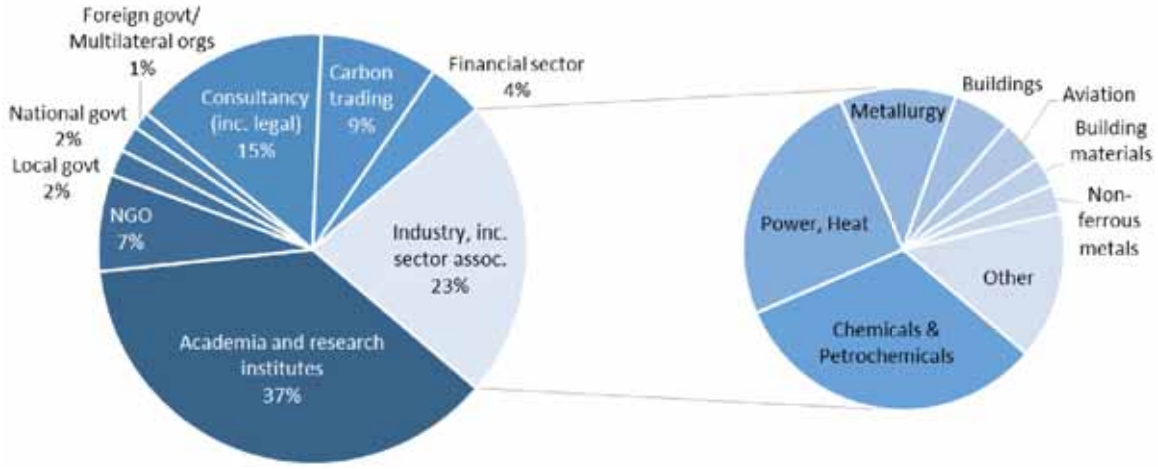

Figure 1 Q1-2 How would you classify your organization?
Note: total number of responses n=304. See Appendix for details.

English language and Chinese language versions of the survey were made available. 279 (92%) respondents using the Chinese version of the survey, and 25 (8%) respondents used the English version. The ratio of Chinese respondents is much higher than the 2013 survey (91% compared to 51%), showing that China's carbon trading is increasingly a domestic effort.

Industry responses

In total, 68 responses from industry were collected. Of the responses from industry, close to half identified themselves as belonging to state-owned companies.

19 industry respondents operate under pilot ETSs in China, including all of the pilot regions, except for Shenzhen. While most companies are not exposed to ETSs internationally, 11 respondents were companies that operate under the EU ETS. 5 respondents are operating under both pilot Chinese schemes and the EU ETS.

A significant number of industry responses come from either small or non-emitters (under 5,000 tce/year) – 32% – or very large emitters (over 1,000,000 tce/year) – 28%.[5] The smaller emitters tend to be private companies, while the very large companies are dominated by state-owned enterprises.

Industry respondents by size and ownership type

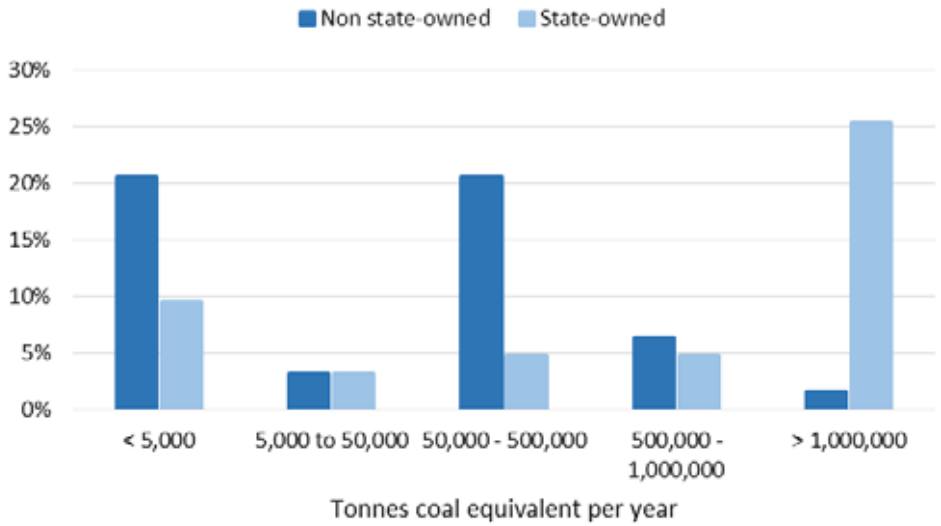

Figure 2 Q1-6 How much energy does your company annually consume in China? (by enterprise type, according to answer for Q1-4)

The industry response rate was lower than expected. This is despite strong efforts by the authors to reach out to industries which are currently or will soon be subject to a carbon trading scheme. The low response rate may be because the ETS pilots are still very young and industries had a limited role in their design – some industry representatives may not yet consider themselves to be in a position to provide expectations about carbon pricing. Some industry representatives may also have been reluctant for fear of disclosing environmental or strategic business information.

Responses by region

Respondents to the survey are from organisations concentrated in Beijing, and other areas where emissions trading pilot schemes already exist. Over 66% of respondents are from pilot regions, while 27% are from non-pilot regions. The remaining 7% are from organisations not based in mainland China.

Respondents from Beijing account for 46% of total responses. This reflects the concentration of the policy-making, consultancy, NGO and expert communities in the capital city, and also

[5] Small or non-emitters includes 12 respondents from key emitting industries that are likely to fall within the scope of a national ETS, while 7 include respondents who self-identified their sector as "Other". Five of these further identified as related to the IT sector, one is from a sectoral association, and one self-described as "environmental protection".

because both CCF and ICF have stronger networks in their home city. After Beijing, the highest number of respondents are from Shanghai (8%) and Hubei (7%), which are regions with relatively dynamic carbon trading pilots, and perhaps also a reflection of the current capacity and level of readiness in these regions.

Survey respondents by region: about half from Beijing

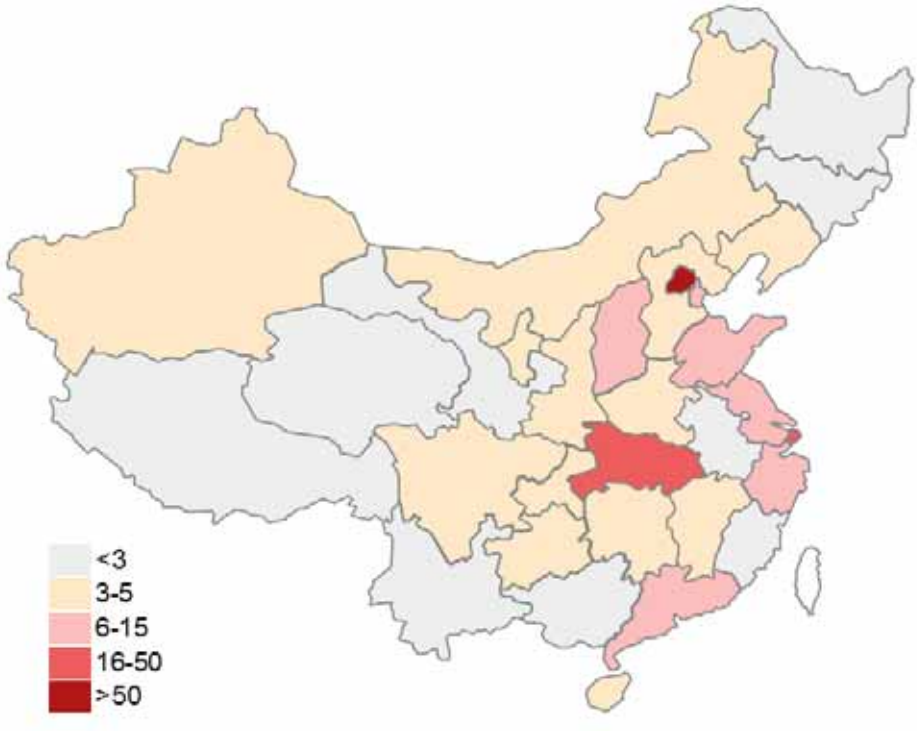

Figure 3 Q1-1 Where is your organization located? - Number of responses

The pilot emissions trading schemes

China's *12th Five-Year Plan* (FYP) laid out plans to gradually set up a carbon trading market. In October 2011, China's National Development and Reform Commission (NDRC) designated four municipalities (Beijing, Chongqing, Shanghai and Tianjin), two provinces (Guangdong and Hubei) and the special economic zone of Shenzhen City as regions for ETS pilots.

The seven ETS pilots became operational between June 2013 and June 2014. This beat the expectations of respondents who participated in the 2013 survey: at the time, only 56% of respondents expected that all 7 pilots would be operational by the end of 2014.

Prices in the pilot emissions trading schemes

Prices in the seven pilot schemes have significantly fluctuated. Prices in many schemes temporarily rose following their establishment in 2013 and 2014 (prices in Shenzhen even exceeded 100 RMB/t for a short time in October 2013), but then declined and stabilized throughout late 2014 and early 2015. In May and June 2015 prices in most schemes dropped sharply, largely due to oversupply of allowances. Around the time of the survey, prices ranged from 9.5 RMB/t in Shanghai to 42 RMB/t in Beijing (at close on 31 July 2015).

The *2013 China Carbon Pricing Survey* asked respondents for their expected carbon prices in the pilot regions for the years 2014, 2016 and 2018. Predictions for 2014 can now be compared with real prices for that year. Data from the seven pilot regions show that average prices for the 2014 calendar year were consistently higher than those expected in the 2013 survey.

In 2014, prices in the ETS pilots were higher than expected

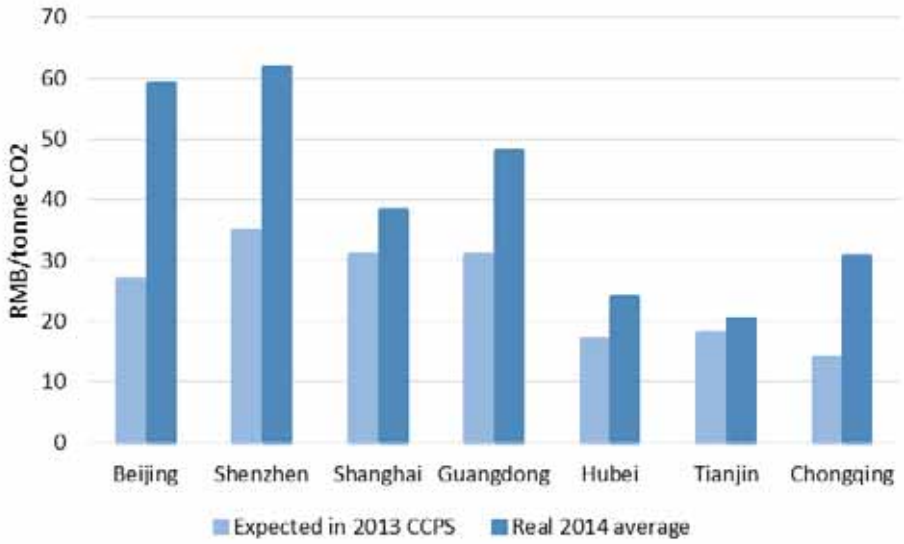

Figure 4 Average prices China's pilot ETSs in 2014 as expected in the 2013 China Carbon Pricing Survey *and real average prices for the same year. [Data source: ICF International]*

In relation to current prices in the summer of 2015, the vast majority of respondents to this year's survey indicated that carbon prices in the pilots were lower than (41%), or similar to what they expected (47%). Very few considered current prices to be higher than expected.

There was sectoral variance among the group surveyed about price expectations. About half of the academic respondents indicated that the price is similar to their expectation, while a high proportion of private sector respondents indicated that the price is lower than their expectation.

In mid-2015, prices in the ETS pilots were lower than expected

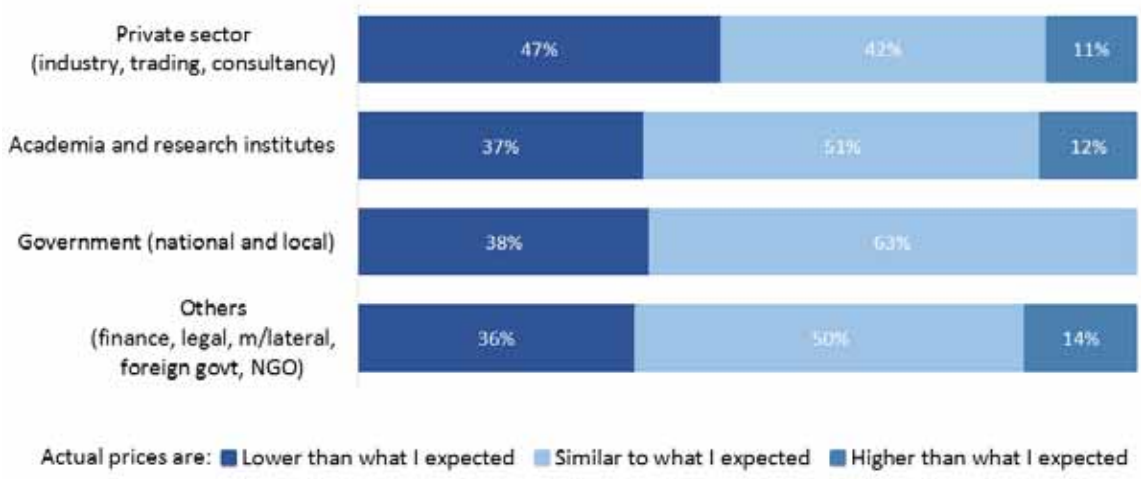

Figure 5 Q4-1 How do the current prices in ETS pilots compare with your expectations?

The apparent discrepancy between higher average prices than those expected in 2013, and a significant proportion of respondents now suggesting that prices are lower than their expectations, may be largely explained by the drop in market prices that has occurred before the survey in 2015.

When asked about the future price for each of the pilot schemes, about half of respondents left all blanks or only gave expectations for one or several of the pilots. Those who responded generally expect prices to quickly rebound from their current low levels.

Prices in the ETS pilots are expected to quickly rebound

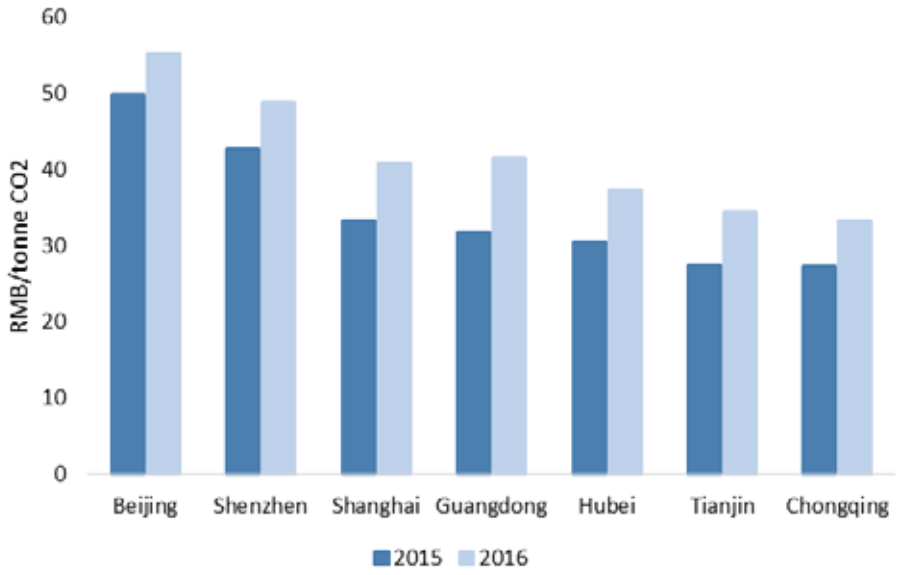

Figure 6 Q4-4 What are your price expectations for each of the ETS pilots? By 31st December 2015; By 31st December 2016

There was significant variance in expected prices for 2016, and expected prices also differ between respondent-type. Industry expectations are often higher than those of non-industry respondents, especially in Guangdong and Hebei (12 and 10 RMB/tonne above the 2016 average respectively).

Factors influencing prices

When asked what are the main factors influencing prices in the ETS pilots (multiple answers could be selected), a majority of respondents (238 out of 304) identified 'government regulation and intervention' as the most important factor. Other factors were also considered important, with 147 selecting 'economic growth rate', and 140 choosing 'information transparency'. Interestingly, government respondents do not consider 'government regulation and intervention' as a main factor.

Factors influencing prices by respondent group

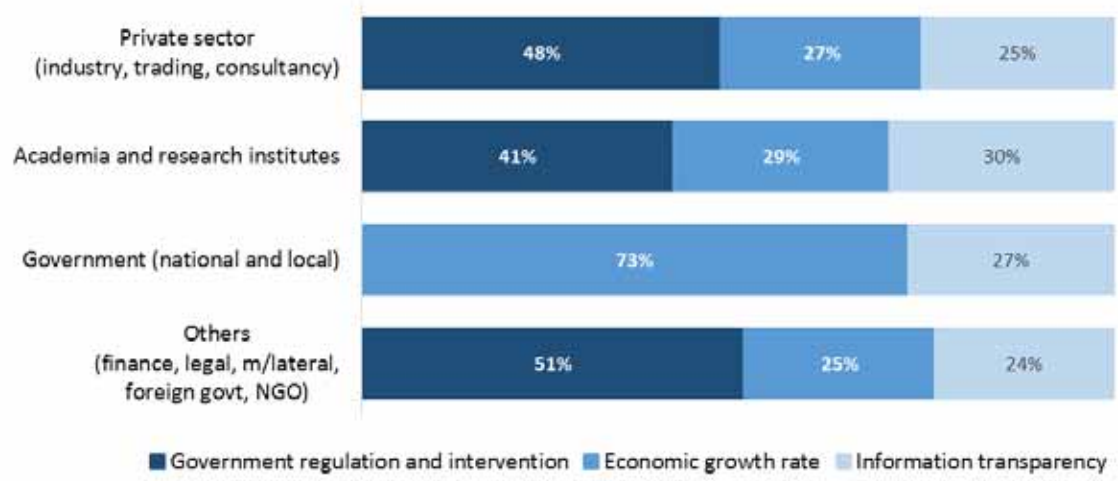

Figure 7 Q4-2 In your opinion, what are the main factors influencing prices in the ETS pilots?

What needs improving?

Respondents were asked which areas of current ETS design require improvement, and could choose one or more. Very few respondents selected 'no, ETS design is already quite good'. All of the areas which were included in the survey were chosen by many respondents, including 'allocation of allowances', 'level of the cap', 'monitoring and reporting systems', 'accreditation and verification systems', and 'registry and market oversight'. Overall, it appears a lot of work still needs be done to improve the design of China's ETSs.

Many aspects require further improvement

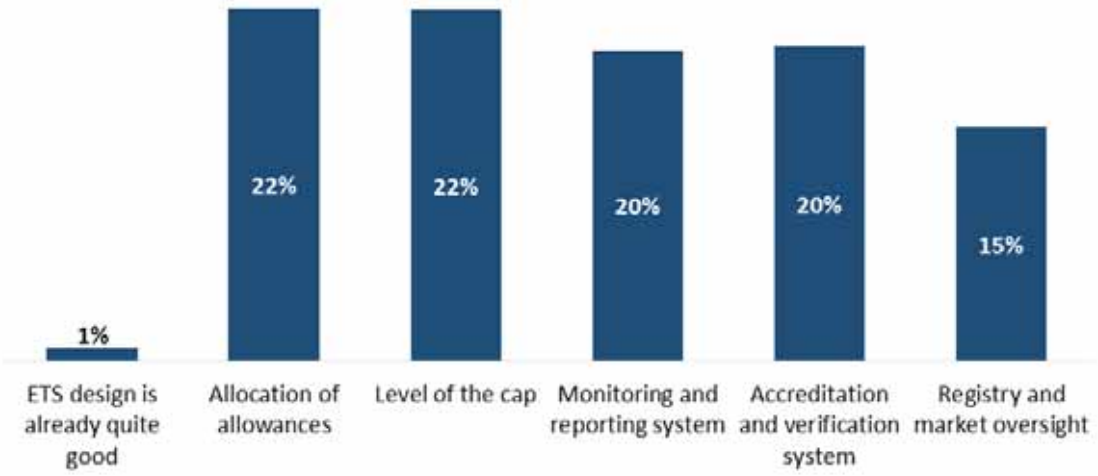

Figure 8 Q4-3 In your opinion, does current Chinese ETS design need improving? If so, in which areas?

Selected quotes: What aspects of the current ETS design need improving?

- *"The major problem continues to be the lack of public information - information which is not publicly available is used for trading by privileged players!"*
- *"Must be open and transparent. China is facing a crisis of trust. If the market is not transparent, companies will think black box operations exist."*
- *"A lack of stakeholder involvement makes regulations quality quite poor. Also, allocation mechanism benchmarks do not reflect real industry conditions. Verification market is distorted by local interests."*
- *"Different quota stringency leads to different vitality in pilot transaction areas. Preciseness, science and coverage of the monitor and inspection systems, as well as the timeliness and operability of the registration and monitoring will affect the willingness of individual participants."*
- Main keywords include: transparency of data, monitoring and verification, cap setting, regional differences, secondary markets, transaction volumes, price interference, introduction of financial institutions.

National emissions trading and carbon tax

The seven ETS pilots lay the groundwork for the adoption of a soon-to-be established national emissions trading system, which could become a key component of China's ambition to control its growing carbon emissions. There have also been reports on the possible introduction of a complementary carbon tax.

Start of national ETS and carbon tax

Survey respondents were asked how they expect the transition to a national ETS will occur, by when they expect the national ETS to start, and by when they expect a national carbon tax to be in operation. They were then asked about their price expectations for such instruments.

Regarding the transition from the current pilots to the national ETS, 264 respondents answered a multiple choice question setting out various scenarios at the end of 2016. The survey responses suggest there remains significant uncertainty regarding the situation by that time. 33% expect that there will be a single market covering all participating provinces and regions; 41% expect that there will be more pilots than today, operating independently of one another; while 25% expect the situation will be the same as it is now, i.e., 7 pilots only.

Although earlier reports announced the establishment of China's national ETS by the end of 2016, more recent reports suggest it may begin operation in early 2017. This news unfortunately came when the survey had already started, and therefore made this question somewhat ambiguous.

There remains uncertainty regarding the transition to a national ETS

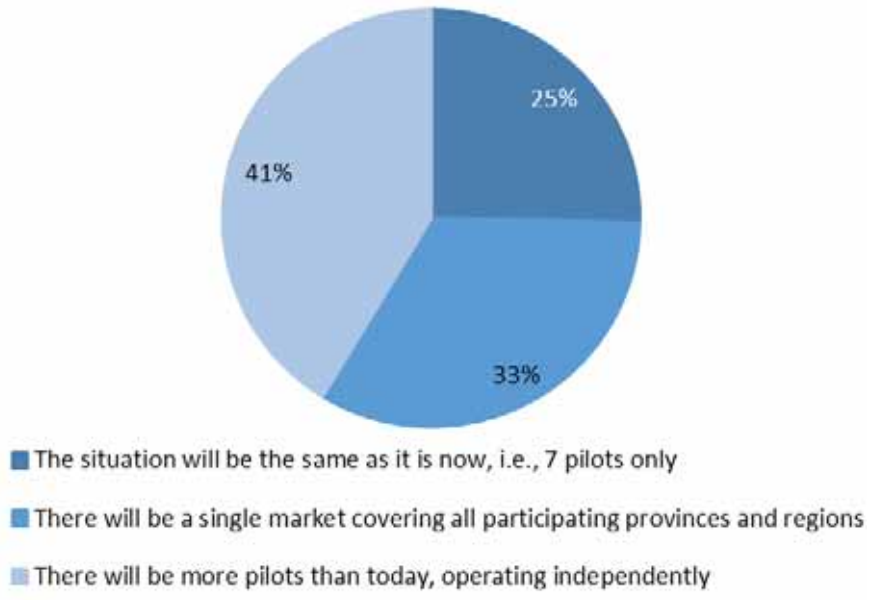

Figure 9 Q5-1 Regarding the Chinese government's transition from the current pilots to the national ETS, what do you expect will be the situation by the end of 2016?

When asked which provinces or regions respondents expected to be covered by an ETS in addition to the seven pilots, most frequently mentioned were the developed coastal provinces such as Zhejiang, Jiangsu, Shandong, Liaoning, and Fujian.

Even though the Chinese government has announced that a national ETS will be established in early 2017, when asked by when China's national ETS will be fully operational and covering all provinces and regions of mainland China, only 33% expect this to happen by 2018 or earlier. A majority (74%) expect the national ETS to be fully operational and covering all of mainland China by 2020 or earlier.

The majority of respondents (83%) expect that China will eventually introduce a carbon tax. 45% expect that this will occur by 2020 or earlier. The expectation for a carbon tax being introduced is lower than in 2013. At that time, 67% expected a carbon tax to be in operation by 2020. This may reflect changing impressions of the relative importance of ETS that comes with the gradual maturing and expansion from the pilot stage towards a national ETS.

National emissions trading scheme is expected to take a few more years to mature

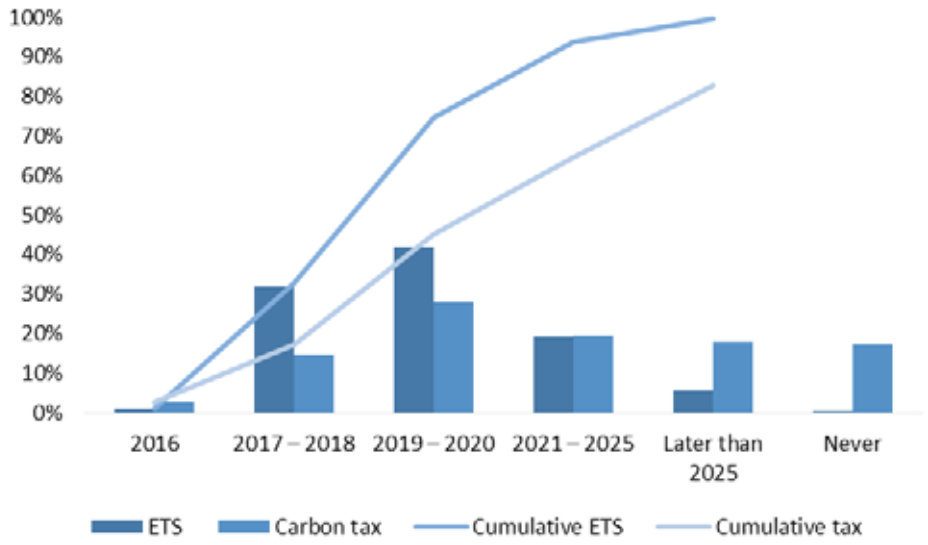

Figure 10 Q5-2 By when do you expect China national ETS to be fully operational and covering all provinces and regions from mainland China?; Q6-3 By when do you expect that a national carbon tax will be in operation, if at all?
Note: The bars in the graph show the expected time of introduction of each mechanism, the lines show the implied cumulative expectation of the respective instruments being in place at different points in time.

Prices in the national ETS

Respondents were asked what they expect the average carbon price to be at different points in time in a national ETS in China. Experts (excluding industry) were subsequently asked what carbon tax level they expect to apply at different points in time. The results indicate an expectation of steadily rising prices, but with significant variance over the levels.

For a national ETS, the average price expectation (including zeroes but excluding blanks)[6] is RMB 39/t in 2017; RMB 45/t in 2018; RMB 56/t in 2020; and RMB 70/t in 2025.[7] There is wide variation in the individual responses, especially in the more distant future: at 2025, the 20th percentile is RMB 40/t and the 80th percentile is RMB 100/t.

43% of respondents provided no price estimates. Recent price fluctuations and the high level of uncertainty may lead many respondents to be reluctant to provide a quantified price expectation.

Carbon prices are expected to rise over time

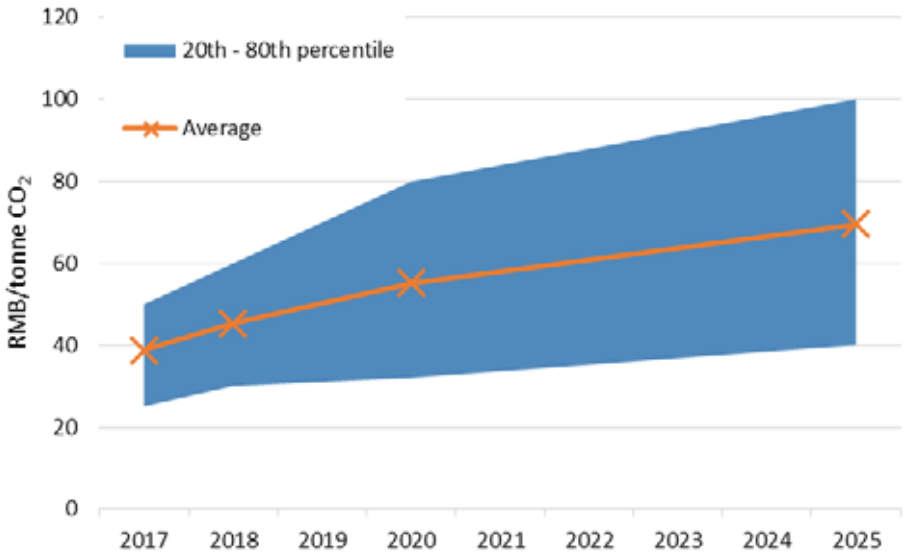

Figure 11 Q5-4 What do you expect the price in the national ETS to be?

It is worth noting that the expected ETS price is not an accurate indicator of the overall government effort to reduce carbon emissions, because the ETS is complemented by non-pricing policies such as mandatory closure of inefficient facilities, incentives for energy saving, renewable energy feed-in tariffs, etc.

[6] These averages included zero responses but did not include blanks. A zero is interpreted to mean that the respondent expects the price to be zero, whereas a blank is interpreted to mean that the respondent is uncertain of the carbon price.

[7] Price expectations for a national ETS are equivalent to EUR 5.72 in 2017; EUR 6.60 in 2018; EUR 8.07 in 2020; and EUR 10.27/t in 2025 (using exchange rates on July 31st 2015). Source: http://www.oanda.com

Expectations vary between industry and other respondents, with industry expecting prices to rise faster than other respondents after 2018. This is somewhat unexpected – other similar surveys conducted in Europe and Australia tended to show lower carbon price expectations from industry (probably reflecting their hope for lower prices).

For the national ETS, industry also expects higher prices than other respondents

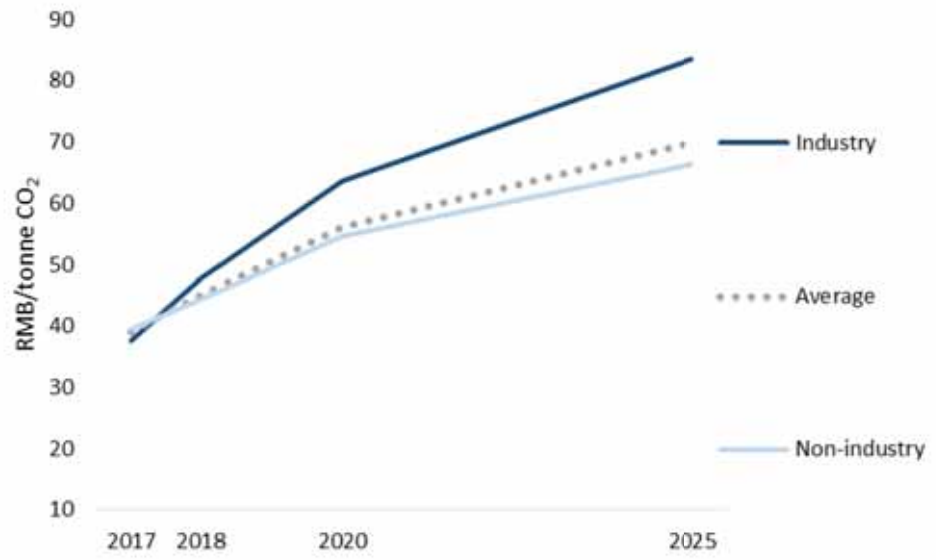

Figure 12 Q5-4 What do you expect the price in the national ETS to be? - Industry vs. Non-industry

Selected quotes: What do you expect the price in the national ETS to be? Why?

- *"At the initial stage of unifying the national carbon market, the carbon price will be relatively low. With the quota tightening, the carbon price will be going up."*
- *"The unifying of the national market should go step by step. They should keep regional ETSs covering all regions with different prices for a while."*
- *"The carbon market is affected a lot by policies, thus it's hard to predict. But there should be a stable expectation. Too much fluctuation is no good for emission reduction objectives."*
- Keywords frequently mentioned include: cap setting, cost of emission reductions, limited information, maturity of the carbon market, economic growth, comparison with international markets, regional differences, price stability, power market reform, emerging technologies.

Carbon tax levels

Of respondents who do expect a carbon tax to be in effect, 64% provided an expectation of the price level. The average expectation of the carbon tax is RMB 23/t in 2016, RMB 31/t in 2018, RMB 40/t in 2020, and RMB 50/t in 2025.

However, more than half of the respondents do not expect a carbon tax to be in effect by 2020. If we include those who responded that they do not expect a carbon tax, and count them as zeroes, the expected carbon tax level falls to RMB 12/t in 2016, RMB 17/t in 2018, RMB 23/t in 2020 and RMB 32/t in 2025.

It is also unclear to which sectors or activities a carbon tax would apply.

A carbon tax is expected, but its timing is highly uncertain

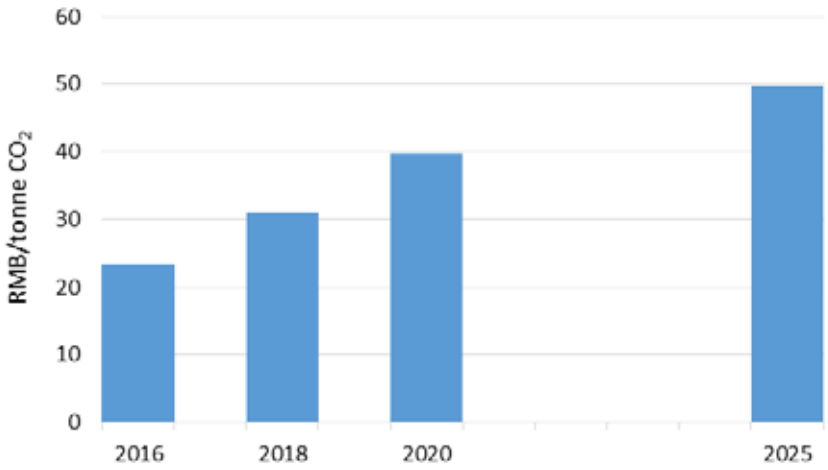

Figure 13 Q6-4 What carbon tax level do you expect will apply in China at different points in time? – Average of positive responses

Linking China's national ETS with other schemes

In principle, ETSs in different jurisdictions can be linked with each other, by making permits from one scheme eligible in another. Barring any restrictions on permit trade, this would result in the same price applying in the linked ETS's, and in cross-border financial flows for permits. Advantages are greater overall cost effectiveness, because of harmonisation of marginal mitigation costs; being able to differentiate targets between jurisdictions without sacrificing cost effectiveness; and greater market depth. But linking requires harmonisation of rules, mutual acceptance of the scheme caps (amount of permits issued by governments) and reliable emissions accounting and enforcement in all participating jurisdictions. A future Chinese ETS could potentially link up with other schemes internationally.

Respondents were asked if they expect China's national ETS to be linked with existing ETS's around the world by 2025, by 2030, or after 2030. While some expect international linking by 2025 (27%), the majority expect this will not happen until after 2030 (52%) or never (15%). Of those expecting international linkages, around two thirds of respondents expect a link with the EU ETS, with some also expecting a link with ETSs in South Korea, the Regional Greenhouse Gas Initiative (RGGI) and California.

The expectations for international linking are much lower than they were in the 2013 survey. At the time, almost 70% of respondents expected a link with the EU ETS by 2025 (compared with 27% now). There has been an increasing recognition that linking is rather complicated and more time is required until it is technically and politically feasible.

Readiness for emissions trading

Respondents from industry and government were asked whether they think that their organisation is adequately prepared to operate under an ETS (for those in the ETS pilots) or to start operating under a national ETS from 2016. The majority of respondents indicated a lack of preparedness for emissions trading.

More work is needed to prepare government and industry

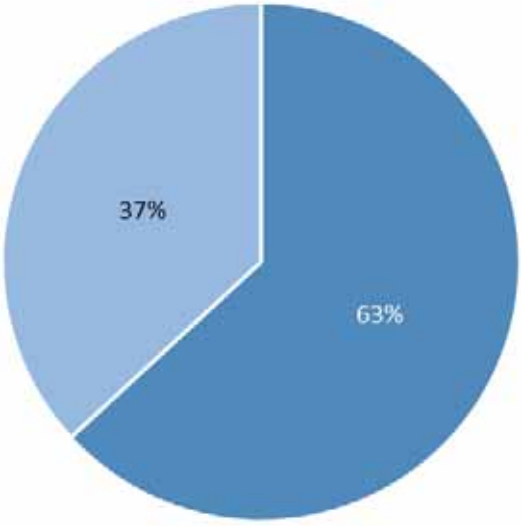

Figure 14 Q2-1 Do you think that your organization is adequately prepared to be operating under an ETS (for those in the ETS pilots) or to start operating under a national ETS from 2016?

The lack of readiness from industry (64%) reflects the late engagement of industry in the preparation of the pilots. In most cases, industry has begun to gain capacity only after becoming part of an ETS, and not in advance. Those industries under the pilots are now sharing lessons and practises of how to operate under ETS with other industries from similar sectors in the regions that are yet to be covered.

Following on from this, respondents were asked to identify in which areas they needed to receive further training in the next two years. This two-year period is when pilot and non-pilot regions will be working towards the implementation of a national ETS.

Needs for further capacity building are broad and diverse. The most frequently chosen priority areas include: 'monitoring, reporting, verification and accreditation' (MRVA); 'carbon finance'; 'corporate compliance strategy'; and 'legal framework and regulation'. It is somewhat surprising that so few respondents consider the use of an ETS registry as a priority.

Capacity building is needed in many aspects

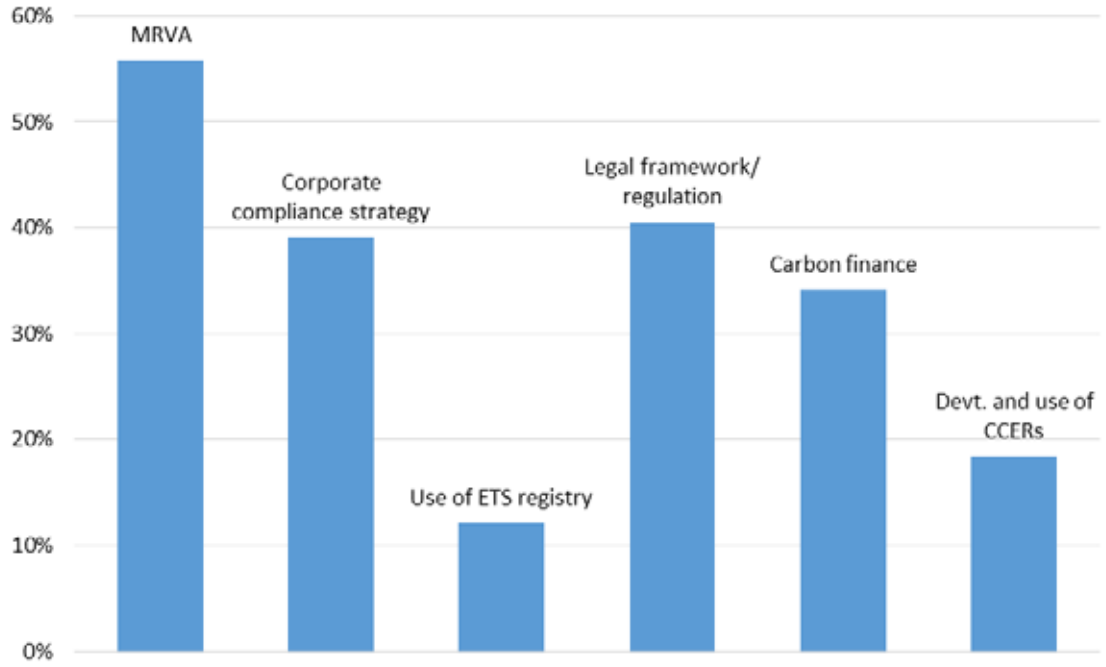

Figure 15 Q2-2 In which areas do you need to receive further training in the next 2 years?

Industry respondents were asked whether they had formulated a compliance strategy for ETS in China. 63% of respondents said they had not yet formulated such a strategy. Of those that have a strategy, most are companies already operating under the pilot schemes. This suggests that the ETS pilots are having a significant impact on corporate strategy. Of companies not currently operating under ETS, only 21% had already formulated a compliance strategy.

Companies under a pilot ETS are much more likely to have a compliance strategy

Figure 16 Q3-2 Has your company formulated a compliance strategy for ETS in China?

Of the companies operating under one of the ETS pilots, 82% of respondents (14 respondents) state that they have set an emission reduction target that is more ambitious than their mandated ETS emissions reduction. This suggests that for many companies which responded to the survey, ETS is used as a driver for change, and/or they expect stricter targets in the future and want to be prepared for this.

Asked what type of actions companies were planning in order to be compliant (one or more could be chosen), the most popular measure continues to be investments in energy-efficiency (90% of industry respondents), followed by trading allowances in the market (79 % of respondents). It is worth noting investments in energy efficiency are also encouraged through other policy instruments.

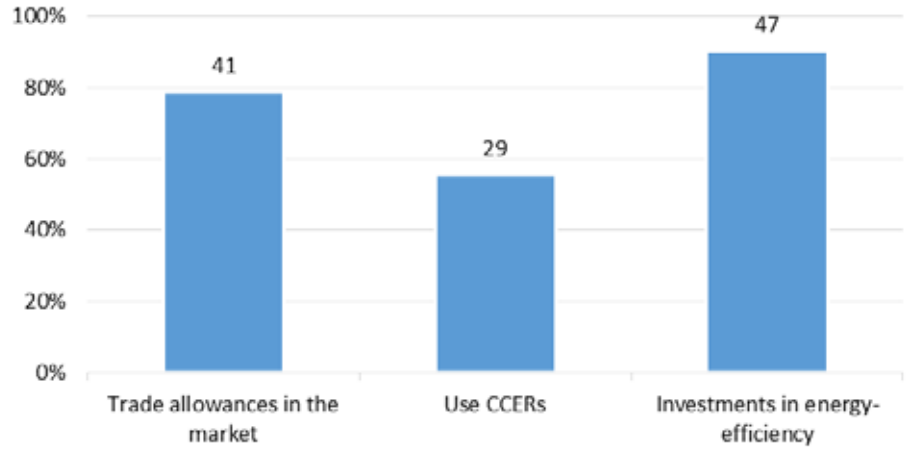

Figure 17 Q3-3 What type of actions are you planning in order to be compliant? – Number of responses and share of total.

Impacts of carbon pricing on investment

Respondents were asked if they expected the price of carbon to affect investment decisions in 2016 and 2020. The large majority does expect carbon pricing to affect investment decisions in 2016: 36% expect investment decisions to be strongly or moderately affected, and 44% expect investment decisions to be marginally affected. By 2020, 82% of respondents expect investment decisions to be strongly or moderately affected. Only 2% of respondents who answered this question expect investment decisions to be unaffected by 2020. Given that the average carbon price expectation in 2020 is around 50 yuan, it is somewhat surprising that this would be seen to have a significant impact on investment decisions. It may also be that the effect of carbon pricing is considered in addition to other instruments (see 'carbon pricing in context' below).

There was no significant variance between respondent groups.

Carbon pricing is expected to have an increasing impact on investment decisions

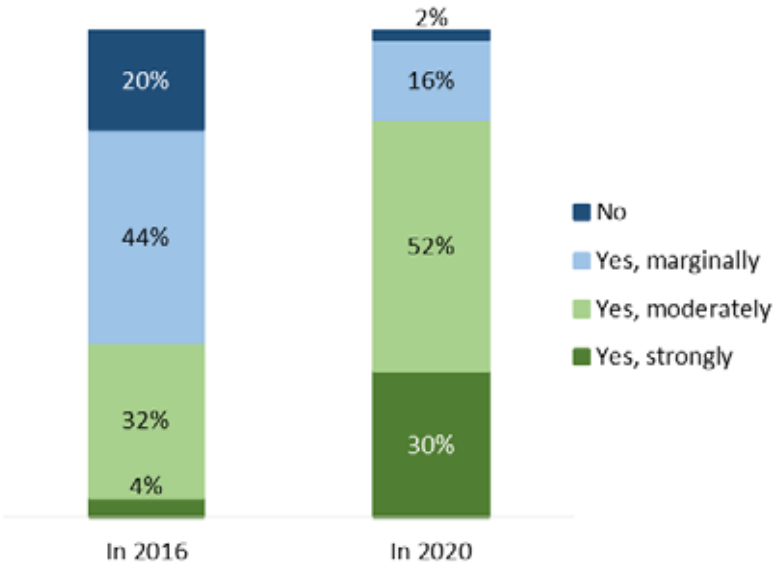

Figure 18 Q3-1 Do you expect the price of carbon in China to affect [your company's/major emitters] investment decisions in 2016? In 2020?

Selected quotes: Do you expect the price of carbon to affect investment decisions? Why?

- *"In 2016, China's carbon market will still be in the pilot phase. Most pilot areas are lenient in issuing quotas and the overall carbon price is low, leading to a small impact on business. By 2020, a national carbon market may increase the expected carbon price, and the impact on business decisions."*
- *"The 2016 period is to encourage enterprises involved to become familiar with carbon trading and basic rules of the system; as the carbon trading market is perfected and national emission reduction targets become increasingly strict, carbon emissions allowances are bound to gradually become a scarce resource."*
- *"The overall quota allocation has been loose, especially when you consider that companies have energy saving targets, the additional emission reduction requirements are small. For 2020 there is great uncertainty, but I estimate that it will be difficult for business to make this the basis for major decisions."*

Carbon pricing in context

Respondents were asked which policies they expect to be the most important in reducing GHG emissions in China at different points in time. The combined expectation of respondents is that the emphasis will clearly shift towards ETS, environmental tax (which may include a carbon tax), and environmental information disclosure in the years up to 2025.

ETS, environmental tax and information disclosure will become much more important

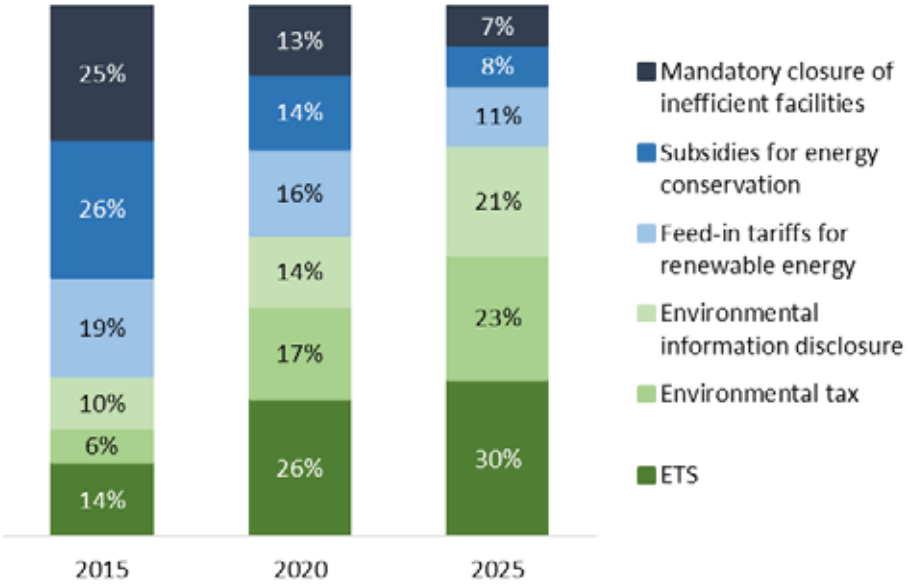

Figure 19 Q6-1 Which do you expect to be the most important policies in motivating companies to reduce GHG emissions in China at different points in time? (please select up to 3 options)

Respondents were also asked which they expect to be the most cost-effective (economically efficient) policies to reduce GHG emissions in China during the 13th Five Year Plan (2016 – 2020). Up to three policies could be chosen. ETS was the most-selected policy, but many also chose the other policy options. This shows that regardless of the increasing emphasis placed on ETS by central government, it is expected to be part of a larger portfolio of co-existing policies.

China's national emissions targets

In 2009 China set a national target for 2020 for emissions intensity (CO_2 emissions per unit of GDP). The goal is to reduce emissions intensity by 40 to 45% over 2005. An intensity target means that the absolute amount of "allowable" emissions increases if GDP is higher, and decreases if GDP is lower. In June 2015, China announced a further target to reduce emissions intensity by 60 to 65% by 2030 (again compared to 2005 levels).

Respondents were asked what form of target they expect to apply in 2025 and 2030, if any. While respondents expect that China will stick to an emissions intensity target for 2025 (82%), this shifts markedly towards an absolute target by 2030 (61%). It is possible that in the coming five to ten years, China may upgrade its 2030 emissions commitment to an absolute target.

Increasing likelihood of an absolute target by 2030

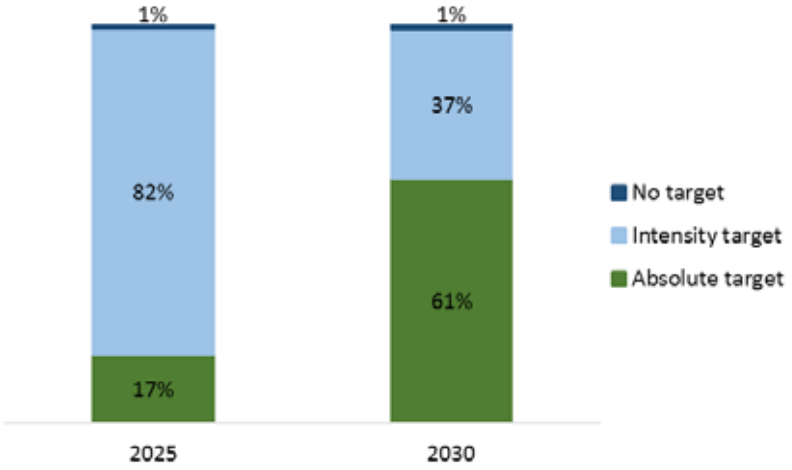

Figure 20 Q7-2 Do you expect that China will take on an emissions target for 2025/2030; if so what type?

There has recently been much speculation over the timing of China's peak in absolute GHG emissions. The peak timing of 2030 or earlier was announced in a joint statement by Presidents Xi Jinping and Barrack Obama in November 2014, and formalized in China's 'Intended Nationally Determined Contribution' which was submitted to the UNFCCC in June 2015.

82% of respondents expect China to achieve the carbon emissions peak by 2030, and 39% even expect China's emissions to peak by 2025 or earlier.[8]

China's emissions are expected to peak ahead of 2030

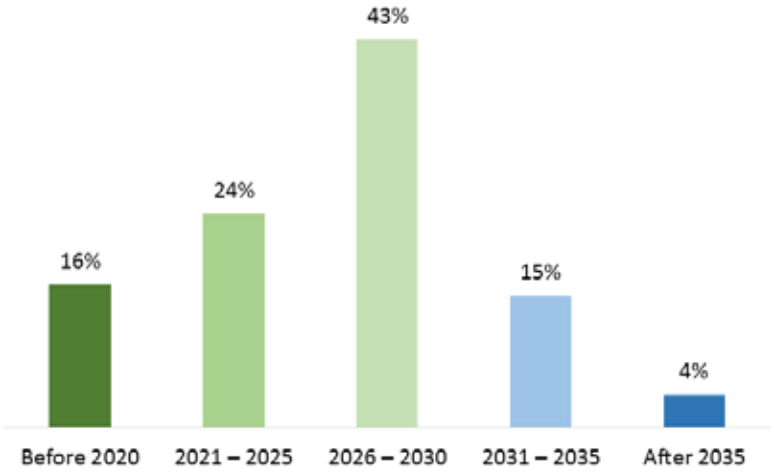

Figure 21 Q7-1 When do you expect China's GHG emissions will peak?

[8] There was some variance among respondent groups. About half of industry respondents (52%) expect the carbon emissions peak to be achieved by 2025 or sooner, compared to 36% of non-industry respondents.

Appendix 1: Survey questions

Sub-section 1: Respondents' background

This first part of the survey aims to identify respondents' profile

Q1-1 Where is your organization located?

We want to understand where the respondents are based. For example, a respondent working in a Guangdong facility of a multinational company should answer 'Guangdong'.

Answer options [use scroll-down]:

- In mainland China (choose your province/region)
- outside of mainland China (choose your region)

Hong Kong / Macau / Chinese Taiwan
Japan / South Korea
Europe and Central Asia
North America
South-East Asia
South Asia
Central and S. America
Middle East
Africa
Pacific

Q1-2 How would you classify your organization?

Answer options:

China national government
China local government
Academia and research institutes
Industry including sectoral associations (to be further specified)
Carbon trading
NGO
Multilateral and bilateral International organization
Foreign government
Financial sector
Consultancy
Legal services
Other

Q1-2-2 [only for 'industry']: Please specify the sector

Answer options:

- Automotive
- Aviation

- Buildings (e.g., residential, Gov. Buildings)
- Building materials (e.g., cement, ceramics)
- Chemicals & Petrochemicals (incl. plastics; rubber)
- Power, Heat production and supply
- Metallurgy
- Non-ferrous metals
- Oil & gas extraction
- Pulp and paper
- Textile
- Transportation
- Other [such as manufacturing, services, etc.] **please specify [open field]**

Q1-2-3 [only for 'industry']: Please specify the enterprise type

Answer options:

- State-owned
- Not state-owned

Q1-3 [only for 'industry']: Is your organization currently operating under an emissions trading scheme in China?

Answer options:

- YES/ NO.
- If YES, Q1-3-1, which one(s) of the seven (choose one or more)?
- Beijing ❒ Shanghai ❒ Tianjin ❒ Hubei ❒ Guangdong ❒ Chongqing ❒ Shenzhen ❒

Q1-4 [only for 'industry']: How much energy does your company (Note: under one legal entity) annually consume in China?

Answer options (tonnes of coal equivalent per year (tce/yr)):

- Less than 5,000 tce/year
- 5,000 – 50,000 tce/year
- 50,000 to 500,000 tce/year
- 500,000 to 1,000,000 tce/year
- More than 1,000,000 tce/year

Q1-5 [only for 'industry']: Is your organization currently operating under an emissions trading scheme outside of China?

Answer options:

- No
- Yes

Q1-5-1 (only for those who responded 'yes' to Q1-5): If yes, where?

- EU ETS
- California
- Quebec
- Alberta
- South Korea
- New Zealand
- Kazakhstan
- RGGI
- Other, please specify [open field]

Sub-section 2: Current capacity and level of readiness

This section aims to understand the current capacity and the level of readiness of companies to take part in an emissions trading scheme.

Q2-1: Do you think that your organization is adequately prepared to be operating under an ETS (for those in the ETS pilots) or to start operating under a national ETS from 2016?

Answer options:

- Yes
- No

Q2-2-1 [only for those who answered 'no' to Q2-1]: In which areas do you need to receive further training? (Choose up to 3 areas you would like to receive trainings in next 2 years timeframe) [for industry]

Answer options:

- Monitoring, reporting,verification and accreditation (MRVA)
- Corporate level organization and compliance strategy
- Use of ETS registry
- Legal framework/regulations
- Carbon finance
- Development and use of CCERs

Q2-2-2 [only for those who answered 'no' to Q2-1]: In which areas do you need to receive further training? (Choose up to 3 areas you would like to receive trainings in next 2 years timeframe) [for all others]

Answer options:

- Monitoring, reporting,verification and accreditation (MRVA)
- Corporate level organization and compliance strategy
- ETS registry
- Legal framework/regulations
- Carbon finance
- Use of CCERs

- Other [can select all that apply]

Sub-section 3: Impacts of the emissions trading schemes on investment decisions

This section seeks to understand the impacts of carbon price levels on investment decisions

Q3-1a [all non-industry respondents]: Do you expect the price of carbon in China to affect investment decisions in 2016? In 2020?

Answer options:

No; Yes, marginally; Yes, moderately; Yes, strongly; Blank

Explanation for answer (optional): [open field]

Q3-1b [only for 'industry']: Do you expect the price of carbon in China to affect your company's investment decisions by 2016? In 2020?

Answer options:

No; Yes, marginally; Yes, moderately; Yes, strongly; Blank

Explanation for answer (optional): [open field]

Q3-2 [only for 'industry']: Has your company formulated a compliance strategy for ETS in China?

Answer options:

- Yes
- No

Q3-2-1 [only for 'industry'; only for those who answer 'Yes' to Q1-3]: Has your company set an emission reduction target that is more ambitious than your mandated ETS emissions reduction?

Answer options:

- Yes
- No

Q3-3 [only for 'industry']: What type of actions are you planning to be compliant?

Answer options:

- Trade allowances in the market

- Use CCERs
- Investments in energy-efficiency
- Other, please specify [open field]

Sub-section 4: Prices in the emissions trading schemes

This section covers questions about current carbon price levels in the pilots and price expectations for pilots and future national ETS

Q4-1 How do the current prices in ETS pilots compare with your expectations?

Answer options:

- Actual prices are higher than what I expected
- Actual prices are similar to what I expected
- Actual prices are lower than what I expected

Q4-2 In your opinion, what are the main factors influencing prices in the ETS pilots?

Answer options (select one or more):

- Economic growth rate
- Information transparency
- Government regulation and intervention
- Other, please specify [add blank box]

Q4-3 In your opinion, which ETS design elements could be improved?

(select one or more)

- ETS design is already quite good
- Allocation of allowances
- Level of the cap
- Monitoring and reporting system
- Accreditation and verification system
- Registry and market oversight
- Other

Please clarify your answer (optional): [open field]

Q4-4 What are your price expectations for each of the ETS pilots by 31st December 2015 and by 31st December 2016? (In Yuan per tonne of CO2)

(Note that this question is optional - if you're not sure about some pilots you may leave blanks)

Answer options: (one column for 2015 and one for 2016)

- Expected prices for Beijing [ ];
- Chongqing [ ];
- Guangdong [ ];

- Hubei [ ];
- Shanghai [ ];
- Shenzhen [ ];
- Tianjin [ ]

Sub-section 5: Transitioning from the seven pilots to the national ETS

This section covers respondents' expectations about China's national ETS.

Q5-1 Regarding the Chinese government's transition from the current pilots to the national ETS, what do you expect will be the situation by the end of 2016?

Answer options:

- The situation will be the same as it is now, i.e., 7 pilots only
- There will be more pilots than today, operating independently of one another
- There will be a single market covering all participating provinces and regions

Q5-2 By when do you expect China national ETS to be fully operational and covering all provinces and regions of mainland China?

Answer options:

- 2016 or earlier, 2017-2018, 2019-2020, 2021-2025, later than 2025, never

Q5-3 [only for non-industry respondents] Other than the current seven pilots, which provinces and regions of mainland China do you expect will be included in China's national ETS by 2016?

Answer options:

- None other than the current pilots
- All provinces and regions of mainland China
- Some provinces and regions of mainland China
  Add text box to specify the names of the other provinces or regions if they want to

Q5-4 What do you expect the price in the national ETS to be in the coming years? (In Yuan per tonne of CO2)

Answer options:

- Expected prices for the end of **2017, 2018, 2020 and 2025**

Explain your answers (optional): [Open field]

Sub-section 6: Policy coherence and policy interactions: National ETS and carbon tax

This section aims to identify how carbon trading might coexist with other policies that will also have an impact in terms of GHG emission reductions and how policy coherence and policy interactions should be considered from the design stage of ETS, including the role of a carbon tax.

Q6-1: Which do you expect to be the most important policies in motivating companies to reduce GHG emissions in China at different points in time?

Answer options: Please select up to 3 options for years 2015, 2020, and 2025

- ETS
- Subsidies for energy conservation
- Feed-in tariffs for renewable energy
- Mandatory closure of inefficient facilities
- Environmental tax
- Environmental information disclosure
- Others, please specify

Q6-2 [for all –optional for industry respondents]: Which are most cost-effective (economically efficient) policies to reduce GHG emissions in China now?

Answer options: Please select up to 3 options
- ETS
- Subsidies for energy conservation
- Feed-in tariffs for renewable energy
- Mandatory closure of inefficient facilities
- Environmental tax
- Environmental information disclosure
- Others, please specify

Q6-3 By when do you expect that a national carbon tax will be in operation, if at all?

Answer options:
2016 or earlier; 2017 - 2018; 2019 - 2020; 2021 - 2025; Later than 2025; Never; Blank

Q6-4 [for non-industry respondents]: What carbon tax level do you expect will apply in China at different points in time? (In Yuan per tonne of CO2)

Answer options: Please specify the expected carbon tax level by the end of the following years, in RMB/tCO2: 2016; 2018; 2020; 2025

Explain your answers (optional): [Open field]

Sub-section 7: China ETS, international carbon markets and international climate policy

This section aims to put China national ETS in the context of international carbon markets and international climate policy; and to understand expectations about its role reducing China GHG emissions.

Q7-1: When do you expect China's GHG emissions will peak?

Answer options: before 2020, 2021-2025, 2026 – 2030, 2031 – 2035, after 2035

Q7-2: Do you expect that China will take on a GHG emissions target for 2025 [2030] and, if so, what type?

Answer options:

2025: no target / intensity target / absolute target;

2030: no target / intensity target / absolute target

Q7-3: Do you expect that China's national ETS will be linked with any other schemes by the year 2025 or 2030?

Answer options: Yes, by 2025 / Yes, by 2030 / after 2030 / never

If yes, which ones? (Select one or more)

- EU ETS
- California
- Quebec
- Alberta
- South Korea
- New Zealand
- Kazakhstan
- RGGI
- Other, please specify [open field]

Appendix 2: Treatment of data

A number of decision were made in relation to the data collected in order to facilitate analysis.

- Some survey responses were deleted if they were duplicate or very incomplete (52). The standard for “very incomplete” was whether they had submitted answers to Q2-1 or Q3-1, the first substantive questions in the survey. Two additional response was removed having not answered beyond Q2-1;
- Two response was deleted as duplicates;
- 11 responses to Q1-2 were adjusted. Where respondents answered “Other”, the detail they provided in the accompanying text box was used to categorise them as either Consultancy (5), Industry (4), or Carbon Trading (2);
- For Q4-4 and Q5-4, four extreme responses were removed;
- Added 0 value to Q5-4 for one respondent who answered "Never" in Q5-2;
- Added 0 value to Q6-4 for all who answered "Never" in Q6-3;
- Changed 3 answers to Q6-4 to 0 based on answer to Q6-3.

Appendix 3: Project Funders

Please see further information overleaf on the following project funders:

- The British Embassy in Beijing;
- The Royal Norwegian Embassy in Beijing; and
- Energy Foundation China.

British Embassy Beijing

China Prosperity Strategic Programme Fund (SPF)

UK Foreign and Commonwealth Office's Prosperity Fund

The purpose of the UK Foreign and Commonwealth Office's (FCO's) Prosperity Fund is to contribute towards the policy goal of **creating the conditions for sustainable global growth.** To achieve this goal there are three key work strands:

Sustainability: Ensuring global security through working towards a low carbon economy, resilient energy markets and promoting science and innovation as solutions to global challenges.

Openness: Working for an open, transparent and strong rules-based international economic system.

Opportunity: Helping British businesses to win new business in areas where they have expertise and can contribute towards sustainable global growth.

The Prosperity Fund Strategy focuses on areas where the **UK is a world leader** and has high quality policy and commercial expertise to offer China. This ensures the best outcomes for China at the same time as delivering UK policy and commercial objectives.

In China, the fund is known as the **China Prosperity SPF programme.** The programme has five policy goals (see box below) which help deliver the FCO's overall goal of sustainable global growth, support delivery of China's 12th Five Year Plan (2011-15), and build ambition for the 13th Five Year Plan (2016-20). Projects need to contribute towards one or more of the indicators under the 5 policy goals.

Financial sector reform:
Increasing the efficiency and sustainability of China's economic growth through financial sector reforms.

Structural reform:
Restructuring the economy for a more sustainable economic growth model.

Business environment and trade:
Improving the business environment for domestic and foreign businesses, breaking down barriers to trade and investment and opening new markets.

Energy and resource security:
Promoting the transparent and sustainable use of energy and resources.

Clean and low carbon transition:
Driving a clean and low carbon transition, boosting green growth and helping to prevent dangerous climate change.

Examples of current relevant SPF projects include:

- "The impact of carbon pricing on the energy and climate policy mix of China"

Please visit https://www.gov.uk/government/publications/china-prosperity-spf-bidding-round for more information.

The Royal Norwegian Embassy

Norway and China have worked together on environment and climate issues for nearly two decades. The cooperation has focused on environmental management and capacity building. Norway supports projects that contribute to China's implementation of global environmental conventions, drawing on highly skilled Chinese and Norwegian partners with core competence in the areas singled out for collaboration. Priority areas for the cooperation have been biodiversity, climate change and management of hazardous substances, such as POPs and Mercury. Norway also gives great importance to our participation in and support to China Council for International Cooperation on Environment and Development (CCICED), a high-level advisory body to the Government of China.

Please explore our website and visit our partners to learn more: http://www.norway.cn/

ENERGY FOUNDATION CHINA

Energy Foundation China, established in Beijing in 1999, is a grantmaking charity organization dedicated to China's sustainable energy development. It is registered under the Ministry of Civil Affairs as Energy Foundation Beijing Representative office and supervised by the National Development and Reform Commission of China. It is a part of the Energy Foundation, which is based in San Francisco, California, U.S.A.

Energy Foundation China, previously known as China Sustainable Energy Program, was initiated with funding from the Packard foundation in 1999 and the Hewlett foundations in 2002. Over the years, our pool of funders has been growing and our cumulative grantmaking in China has reached more than USD200 million.

Our mission is to assist in China's transition to a sustainable energy future by promoting energy efficiency and renewable energy. We support policy research, standard development, capacity building, and best practices dissemination in the eight sectors of buildings, electric utilities, environmental management, industry, low-carbon development, renewable energy, sustainable cities and transportation.

Energy Foundation China has worked with more than 440 grantees. These grantees are the leading policy research institutes, academies, think tanks, and standardization bodies in China and abroad. The number of projects we have funded has reached 1560.

To better meet China's energy and environment challenges and help build a sustainable energy future, we will leverage our program areas' deep technical expertise, strengthen team collaboration and innovation, and focus our resources on the most pressing issues.

For more information, please visit: http://www.efchina.org/

Conducted by:

China Carbon Forum 中国碳论坛

ICF INTERNATIONAL

Funded by:

British Embassy Beijing

NORWEGIAN EMBASSY

ENERGY FOUNDATION 能源基金会