# THE 2020 CHINA CARBON PRICING SURVEY
# FOCUS GROUP AND EXPERT ROUNDTABLE
# SUMMARY OF DISCUSSION

## INTRODUCTION

On 11th September 2020, China Carbon Forum (CCF), convened an industry and expert roundtable on emissions trading systems (ETS) in Beijing, which will help to inform the development of China's national ETS. The roundtable was established to support the 2020 China Carbon Pricing Survey project, and continues a series of industry roundtable discussions established during the 2017 China Carbon Pricing Survey project. The 2020 China Carbon Pricing Survey is implemented by China Carbon Forum, ICF, and SinoCarbon, with inputs from the Norwegian Environment Agency, and funding from Environmental Defense Fund (EDF), Energy Foundation China (EFC), and The Royal Norwegian Embassy in Beijing. It is supported by China Electricity Council (CEC), China Cement Association, the China Non-ferrous Metals Industry Association (CNIA), and China Iron and Steel Industry Association.

Project team members presented selected results from the 2020 China Carbon Pricing Survey to roundtable participants, who then held a focus-group discussion on its results and their implications for policy making. Industry representatives gave insights into their experiences of China's pilot ETS' and their readiness for the national ETS, and the roundtable culminated with a livestream broadcast that focused on new opportunities for carbon finance within the national ETS.

The roundtable involved a total of 42 senior experts and key stakeholders, including representatives from: National Centre for Climate Change Strategy and International Cooperation (NCSC), emitting enterprises and industry associations, local environment and emissions exchanges, carbon asset management companies, relevant research institutions and financial institutions, as well as representatives from China Carbon Forum, Environmental Defense Fund, the Royal Norwegian Embassy, SinoCarbon and ICF.

This report summarises the major topics covered during the roundtable discussion.

## KEY POINTS

- The China Carbon Pricing Survey is a tool which helps enterprises, especially that have not yet participated in the pilots, to gain a more comprehensive understanding of the ongoing development of ETS in China, and know in advance the problems they may encounter and the preparatory work they need to conduct for participation in the national ETS.
- It is necessary to consider whether the supply and demand of allowances determines the carbon price. In China's pilot carbon markets prices are consistently stable, which means that the carbon price has not been directly affected by the allowance supply.
- The State Grid and the top five state-owned electricity groups are facing serious financial losses, especially for plants in economically developed areas. For these power plants, any carbon price will be too high, and purchasing credits under this situation is not sustainable.
- The power sector suggests that other emitting sectors should be involved in the national ETS as soon as possible, and that the carbon pricing mechanism should be reasonable, to avoid one industry benefiting in terms of profitability while another suffers an overall loss.
- A vibrant and mature ETS will depend on a diversity of trading participants. Only when a sufficient number of trading entities are involved, and the trading demands are diversified will the trading volume increase and the market become truly active.
- While appropriate derivatives can serve the purpose of activating the market and facilitating price discovery, excessive market speculation will lead to market risk.
- There is a range of policies on carbon-related information disclosure across the provinces. Apart from the pilot carbon markets, there are five provinces that have issued measures on GHG information disclosure. In addition, the central government is including information disclosure in the KPIs of local governments. Therefore, all provinces will report the progress of work on disclosure in their annual progress reports.
- For the next step, regulation on the compulsory disclosure of information by enterprises should be established, followed by a corresponding incentive and penalty mechanism. At the same time, information disclosure should not only relate to the carbon market, but also with the management of GHG emissions throughout the supply chain.
- Stress testing of carbon risk found that that carbon trading will have a direct impact on the financial performance of emitters and increase the credit risk of commercial banks. Under three scenarios, the cost of electricity from thermal power will rise by 0.23 fen (1/100 yuan), 1.89 fen and 6.7 fen per unit. In the severe scenario, some companies will have their credit

rating downgraded two levels. Overall, the impact on ICBC's credit risk is controllable, as the bank already reduced its exposure to high-pollution and over-capacity industries.

- If the increase in cost is 6-7 fen, then power companies may be unprofitable in the market. Therefore, they believe the carbon price should not exceed 30 RMB. Cost increase is an evaluation criteria for annual assessment of power companies by the state-owned asset regulators. If this increase is excessive, it will be unacceptable for the leadership of SOEs.
- It is suggested that financial institutions should optimise their portfolio structure and provide more support for clean and renewable energy. For thermal power companies, the focus should be on 'intelligent' transformation of operations, to improve efficiency.
- Policymakers, when formulating carbon trading policy, should consider the impact on both enterprises and the financial sector. Financial institutions should do carbon trading stress testing to provide better reference for policymakers. The ratio of paid allowances is a highly sensitive factor, so attention should be paid to that when developing policy.
- ICBC is currently carrying out more detailed stress testing in the coal power industry. While previous exercises were single-factor calculations, either on policy or carbon trading, the current work consider increases in taxation, reduced subsidies, carbon trading and replacement by renewable energy as representative of transition risks in the model.
- Increasing numbers of financial institutions are using company ESG reports or platforms such as CDP to improve their due diligence assessments prior to investing in a company. The information may also inform their vote at a shareholders' meeting, or in discussions with executives on how the company can improve its management of ESG. For under-performing companies, they can consider eliminating them from the portfolio.
- Chinese companies can see that domestic and international peers are making voluntary disclosure of emissions via CDP. In the automotive industry, major automakers ask suppliers to provide their CDP submissions when bidding, and they will score those bids higher. This is gradually being integrated into procurement standards.
- With the level of data disclosure in the EU ETS, market analysts can provide policy interpretation, and review and forecast of the market. Hopefully in China's national market, there can also be such transparency, so that analysts can provide the market with high-quality review and forecast of the market, thereby providing better guidance to investors.
- Regulators in China should take more account of financial considerations in the development of the carbon market. Without this, it is not a real market, and trading cannot be used to achieve fair price discovery, reduce emissions and promote investment.

## KEYNOTE SPEECH

Prior to the panel discussion, Professor Zhang Xin from NCSC delivered a keynote speech, summarising the operation of China's eight pilot ETS', and pointed out that the greatest significance of these pilots lies in putting the theory of market mechanisms for carbon reduction into practice in China, testing what cannot be done, what should not be done, and what needs to be focused on and improved in the construction and development of China's nationwide ETS.

In terms of price discovery, it is necessary to consider whether the supply and demand of allowances really determines the carbon price. The current factors influencing pricing in the pilots could be summarised as: government pricing, bilateral agreement pricing, pricing influenced by psychology (with reference to energy consumption and other factors), and comprehensive pricing. In many cases, regional governments helped to determine the prices at the start of the pilots by reference to model simulations and energy pricing. In addition, the current ETS policy also has uncertainty, including regarding transfer of allowances from pilot to national systems and gradual market convergence will also have an impact on the carbon price.

Finally, the domestic energy market and the ETS do not yet interact smoothly, so the pricing in the pilots is not necessarily reasonable. For example, Beijing's carbon price is high, while coal consumption in Beijing is already very low. The design of China's national ETS needs to take into account the experience of the pilots, so that it can play its role as a market-based policy tool to control GHG emissions and be able to facilitate low-cost emission reduction pathways for emitting sectors.

## FOCUS GROUP & ROUNDTABLE DISCUSSION

This session invited representatives from major emitting sectors, industry associations and other organisations involved in the *2020 China Carbon Pricing Survey* to discuss the significance of the survey results, the way companies communicate with policymakers and how the survey can play a greater role in informing policymaking and development of China's nationwide ETS, from different industries' perspectives. The following is a summary of the views expressed:

1. **The China Carbon Pricing Survey is a tool which helps enterprises to gain a comprehensive understanding of the ongoing development of ETS in China.**

Representatives from the iron and steel industry commented that in recent years, the awareness of companies participating in the ETS for carrying out emissions control work has increased significantly, but for enterprises that have not participated in the pilot carbon markets, they are only familiar with the work related to Monitoring, Reporting, and Verification. By participating in this year's survey, enterprises that have not yet participated in the pilots are able to gain a more comprehensive understanding of the ETS, know in advance the problems they may encounter and the preparatory work they need to conduct for participation in the national ETS. In addition, enterprises in the steel industry that have already participated in the pilots still have much work to do in order to effectively participate in the ETS due to the varying and complex industrial processes in the sector. Therefore, the Carbon Pricing Survey indirectly plays a capacity building role for the iron and steel industry. Aluminium sector representatives also participated in the project in order to promote good decision-making. Similar to the steel industry, large companies may be more prepared in this area, but for small and medium-sized enterprises, they may have no professional experience nor actively considered this issue. It is very important, therefore, for the aluminium representatives to participate in the survey and in this roundtable, and they will continue to conduct in-depth research in the future.

2. **The survey should take into account the interests and knowledge level of different respondents and reflect this in the weighting of responses.**

A representative from the power sector suggested that the survey should take into account the subjective views of different respondents. For example, emitting enterprises tend to suggest that the carbon price is too high, but this may not be representative. In addition, some

participants believed that different respondents should be given different weighting when analysing the survey results to improve the scientific validity of the analysis. For example, greater weight should be given to the power sector, as it is the first to be covered by the national ETS, while different weighting should be given to other industries according to the actual situation of emitting enterprises.

Representatives from the iron and steel industry pointed out that some smaller enterprises in the industry had relatively weak capacity and a limited sense of many ETS related issues, which led to a limited view on how to fill in the survey questionnaire. On the other hand, the leading enterprises in the industry have a better understanding of the carbon market. It is suggested that the responses from leading companies could be highlighted to make the information from the survey results more valuable.

3. **It is necessary to consider whether the supply and demand of allowances plays a decisive role in determining the carbon price.**

China's pilot carbon markets prices have been consistently stable, which means that the carbon price has not been directly affected by the allowance supply. China's eight regional markets have the following features: 1) The carbon price in the pilots is generally stable, but the main reason for such "stability" is that the market is not sufficiently active; 2) The carbon price in the pilots is seasonal, with active trading during the one to two months prior to the compliance period, resulting in a significant price increase; 3) The carbon price in the pilot ETS is low, with the price in most pilots being around 20-30 yuan per tonne, and the volume of transactions does not reflect the real market demand; 4) The carbon price in the pilot ETS does not fully play the role of a market signal and therefore provides limited guidance for enterprises to reduce their greenhouse gas (GHG) emissions, nor do enterprises use the ETS as a channel for green financing or an incentive for the development of low-carbon technologies; 5) Much work needs to be done in the pilots in terms of transparency of trading and information disclosure.

4. **Other emitting sectors should be involved in the nationwide ETS as soon as possible, and a reasonable carbon pricing mechanism should be adopted.**

Representatives from the power sector suggested that at the current stage, the emission reduction potential for the power sector is limited. The vast majority of electricity generation enterprises have completed a low-emission technology transformation during the period of

the 12th Five Year Plan (FYP) and the 13th FYP. The share of renewable energy generation in the installed capacity of large-scale electricity groups has reached 40% to 50%. However at present the curtailment of wind and solar power across China is serious, indicating that in terms of market demand, the space for expanding renewable energy is also limited. In addition, the State Grid and the top five state-owned electricity groups are facing serious financial losses, especially for those plants in economically developed areas. For these power plants, any carbon price will be too high, and purchasing credits under this situation is not sustainable. Therefore, it is suggested that other emitting sectors should be involved in the nationwide ETS as soon as the market condition is mature. Power generation groups should also be allowed to complete compliance either as a single unit, or the groups' internal transaction costs should be minimised, in order to reflect the advantages of group-level management and reduce the cost of compliance. The synergy between different policy instruments such as the electricity market, green power certificates and the trading of energy use quotas can also help reduce the burden on electricity enterprises. Given the current situation whereby the carbon price cannot be transferred downstream, a relatively low price would be more appropriate for electricity enterprises. In general, the carbon pricing mechanism should be reasonable to avoid one industry benefiting overall in terms of profitability while another industry suffers an overall loss.

**5. A vibrant and mature ETS will depend on a diversity of trading actors.**

Looking at the experience of the Guangdong pilot ETS, in recent years most of the top entities in terms of cumulative trading volume have been investment institutions, while only one of the top ten trading entities was an emitting enterprise. Direct transactions between emitting enterprises in the Guangdong pilot accounted for only a small share of total trading. Some participants said that the ETS must have a certain level of trading volume at the beginning and suggested that the national ETS could expand the range of trading entities. Only when a sufficient number of trading entities are involved, and the trading demands are diversified will the trading volume increase and the market become truly active. For example, third-party trading institutions will conduct market research and analysis, facilitate market price discovery and improve the transparency of the ETS. Only when more institutions participate in the ETS will market information become more specialised and transparent, and the market development follow the direction that policymakers have set. However, if there are too many trading entities and the market is too active, some participants were worried that it might

result in a mismatch between the cost of emission reduction and the cost of purchasing allowances, which is not conducive to the long-term sustainable development of China's national ETS.

In addition, some participants noted that most emitting entities that will be involved in the national ETS are state-owned enterprises, the trading strategies of which might be conservative, and the market behaviour relatively simple as the trading entity is a single company. Therefore, at the beginning of the national ETS, the supply and demand of allowances might not result in scarcity, resulting in a low carbon price. With the gradual involvement of other sectors and an increase in other market players, the carbon price will rise steadily and tend to stabilise around a reasonable level.

**6. China's nationwide ETS should to be designed to avoid excessive market speculation.**

From the regulator's perspective, the trading of carbon emission rights is a trade-off between emission reduction costs and transaction costs, and the purpose of a reasonable carbon pricing mechanism is to find ways for enterprises to optimise cost management. Appropriate speculation can serve the purpose of activating the market and finding a reasonable carbon price, while excessive market speculation will lead to market risk, which is not conducive to the implementation and development of China's nationwide ETS.

## EXPERT PRESENTATIONS

In the afternoon session, expert presenters spoke on the topic of Transparency, Finance and China's Carbon Market. Presentations were made by: China's major climate change policy think tank, NCSC, on the importance of data transparency in the operation of the carbon market; the world's largest commercial bank, ICBC, on the effect of carbon trading on commercial banks' credit risk; the premiere organisation for carbon emissions disclosure, CDP, on the implications of TCFD and ESG disclosure for the carbon market; and market analysts Refinitiv, on their view and experiences of these issues from the EU Emissions Trading System.

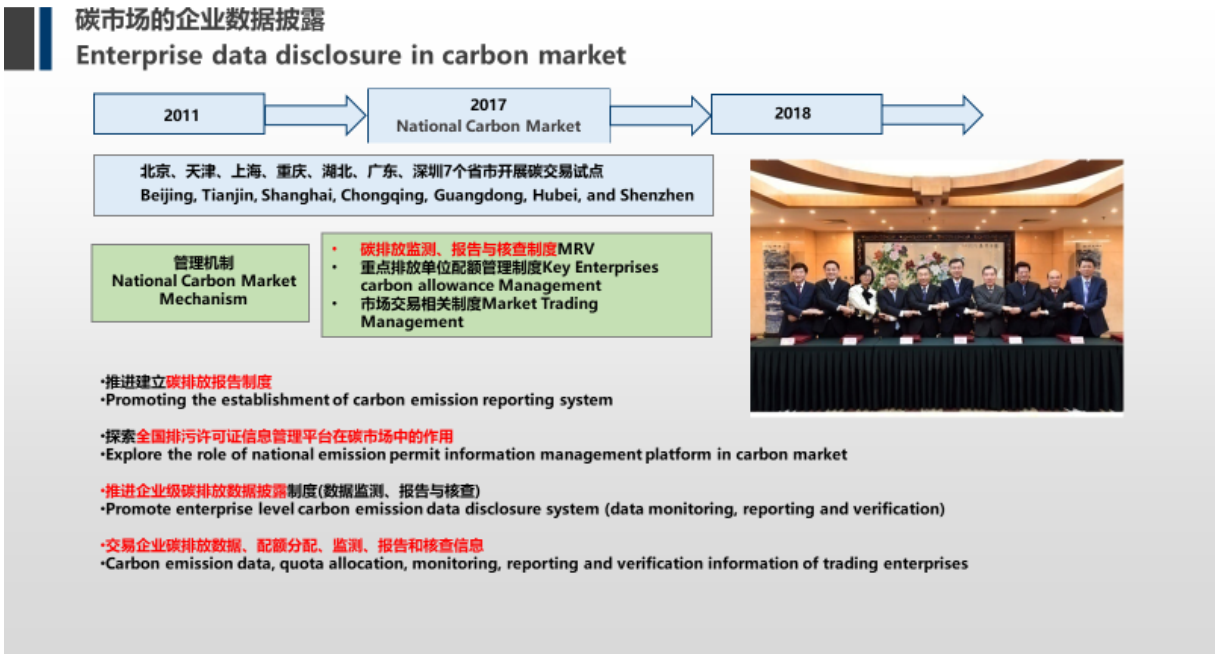
### China's carbon market and information disclosure

*Tian Danyu, National Center for Climate Change Strategy and International Cooperation*

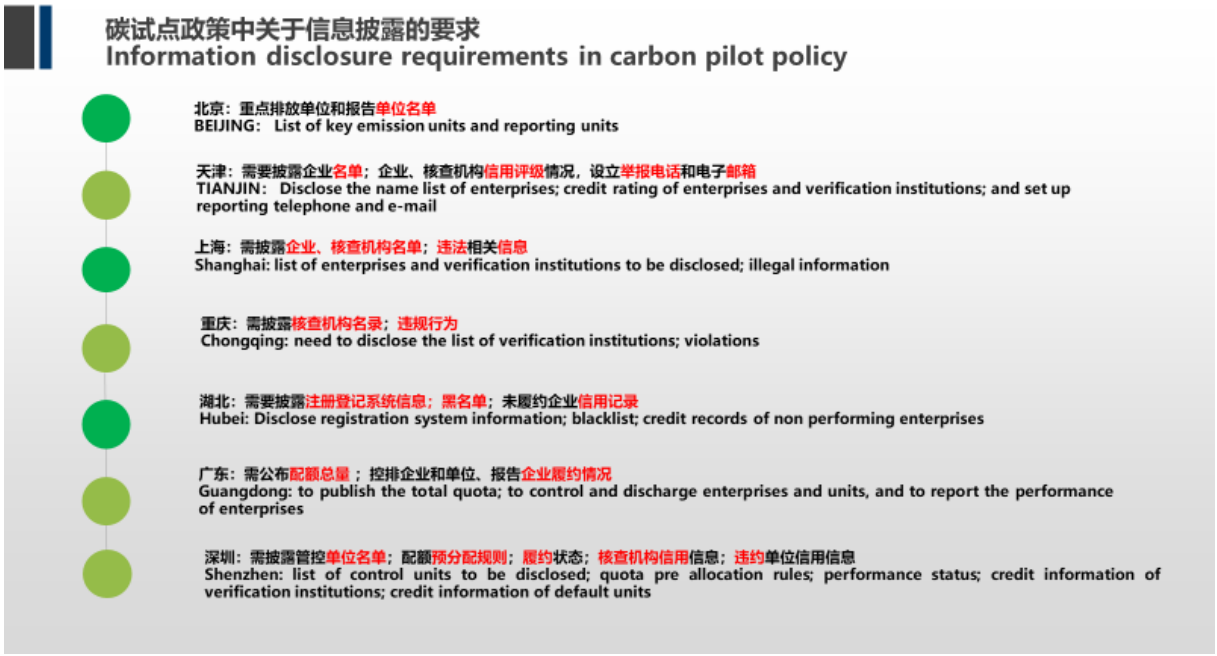
- When it comes to information disclosure, there are two layers: 1) Government disclosure: last year the State Council instigated a major overhaul of information disclosure

requirements across government, and disclosure regarding environmental protection was emphasised. It required that government departments at or above county level provide annual information disclosure reports by the end of January. However, annual carbon emissions data may not be ready by this time, so it has imposed pressure on regulators. We intend to establish a unified information disclosure platform this year. 2) Enterprise disclosure: listed companies and covered entities must make disclosure of emissions and measures taken to reduce emissions.

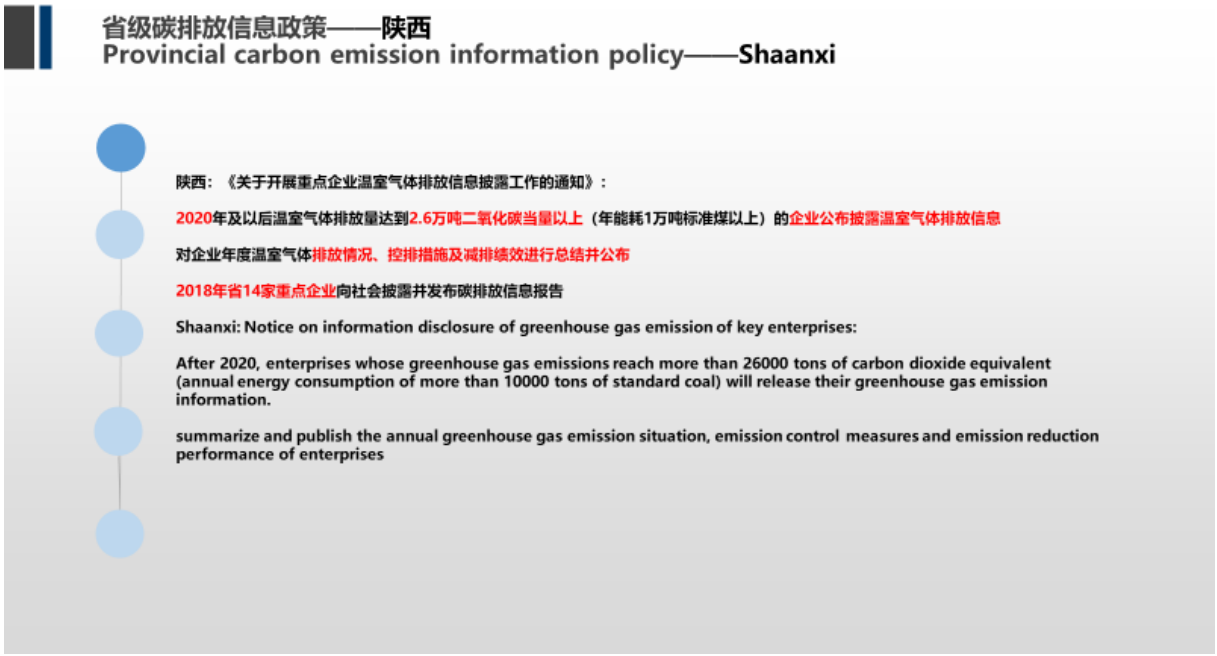
- The Ministry for Ecology & Environment (MEE) published a catalogue for information disclosure. In relation to climate, government departments have to make disclosures against it. We conduct an evaluation of the work done by government departments at the end of the year to see whether it is adequate, and usually only about half have met the requirements.
- In the climate field, the only item required to be disclosed is CDM administrative approvals. The CDM has been dormant for several years, but we still have the platform, and the government can refer to this in order to learn from CDM mechanism.
- We have had the seven pilot markets for several years and from this we have discussed what would be the basis for the establishment of the national market. The focus of these discussions has been on three key mechanisms of the ETS, namely: the MRV, allowances and trading mechanisms.



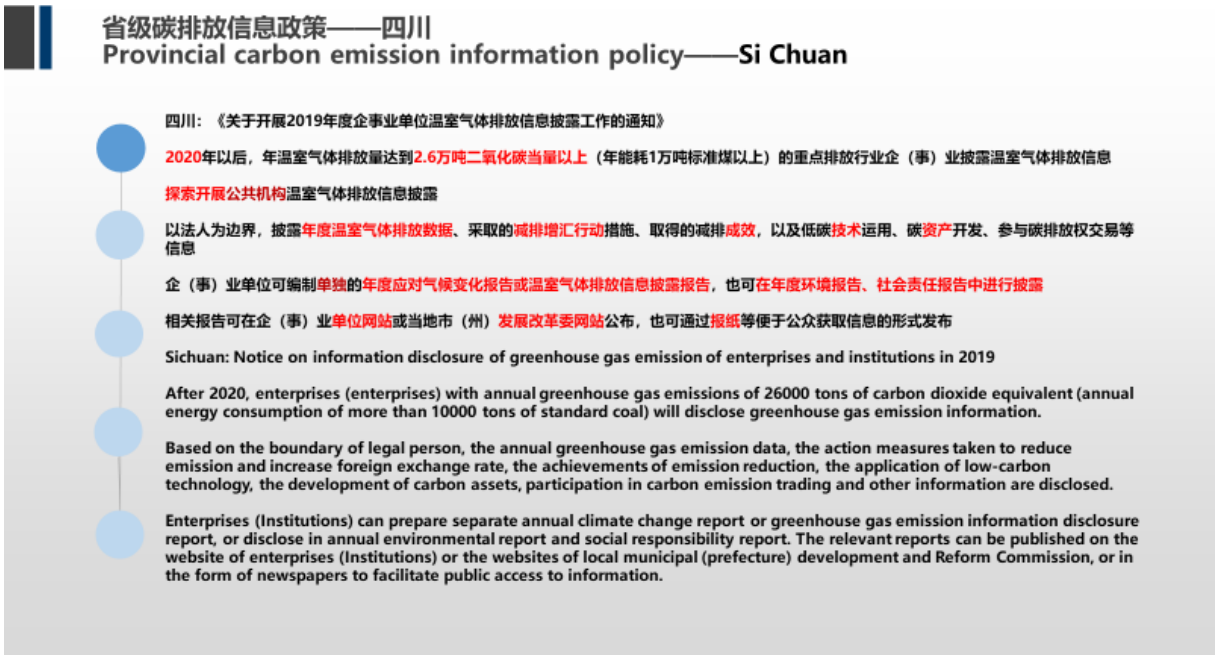
- After we moved from the National Development and Reform Commission (NDRC) to the MEE, we began to look at how to avoid multiple overlapping platforms within the MEE, and ensure that there is a single platform that can fulfil all requirements. We have been actively exploring how to integrate data, and the current direction is that we will include carbon emissions management within the MEE's pollution management platform.
- The requirements for information disclosure vary across the pilot's regions. Beijing requires only publication of the list of covered entities. In addition to the list, Tianjin requires the credit rating of the verification agencies, and contact details. In Chongqing it is required to publish the list of verification agencies and record any violations. In Shenzhen, the list of covered entities, rules, compliance status, credit rating and default record is published. It can be said that from north to south the pilots become stricter and the specific obligations to disclose emissions information are more detailed.



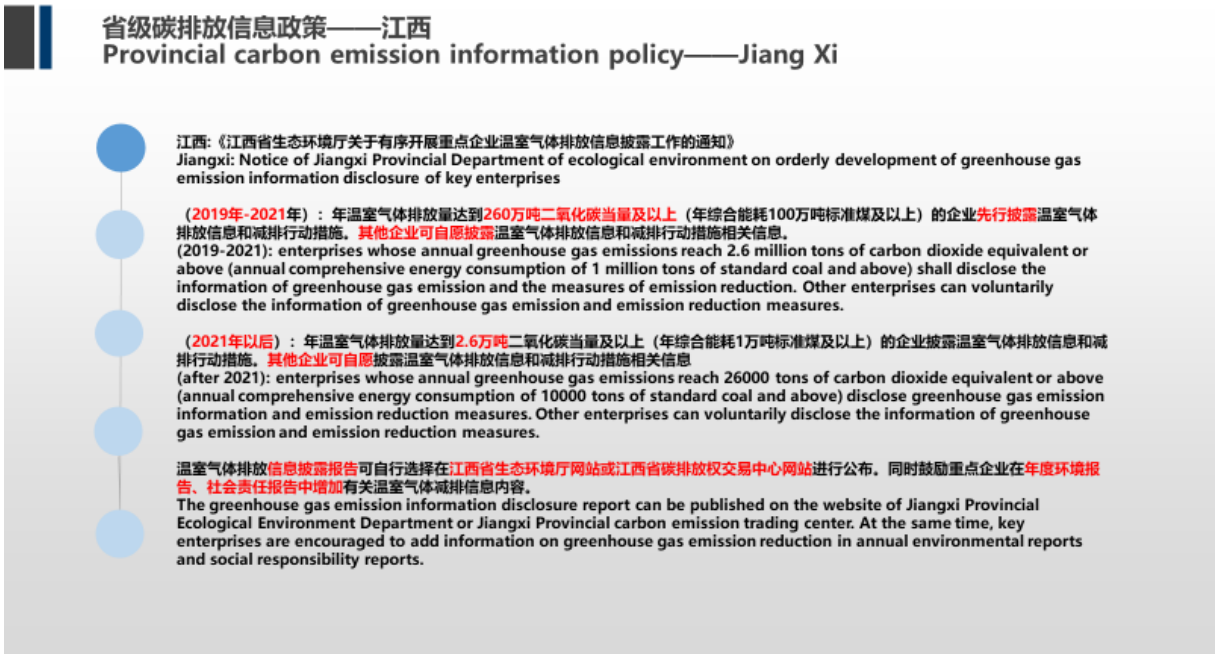

- In the 13th FYP, the establishment of a management system for carbon emissions information disclosure was actually mentioned, but this was not achieved nationwide within the 13th FYP period.
- Across the remaining provinces, there is also a range of policies on carbon-related information disclosure. Apart from the pilots, there are five provinces that have issued relevant measures on GHG emissions information.
- Shaanxi's rules require that after 2020, enterprises with emissions of over 26,000 tons $CO_2e$, will release GHG information. Already 14 companies have made such disclosures.




- In Sichuan, after 2020 enterprises with over 26,000 tons $CO_2e$ will disclose emissions information as well as the kinds of measures and technology taken to reduce emissions. This may be disclosed on company websites or in newspapers.

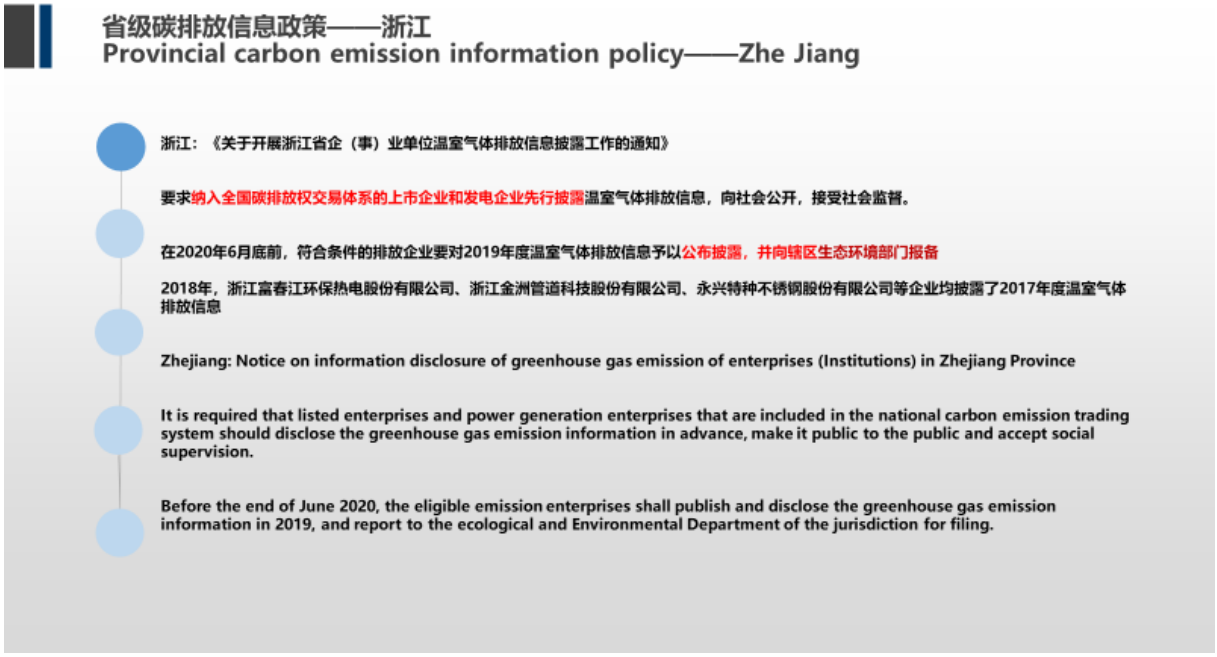



- In Jiangxi, there are several phases. During 2019-2021, enterprises with over 2.6 million tons $CO_2e$ need to report. This will only capture very few companies, but after 2021 the threshold will be 26,000 tons $CO_2e$. The information will be available on the website of the Jiangxi Department of Ecology and Environment, or the trading centre, and may be reported in the Annual Reports of enterprises.



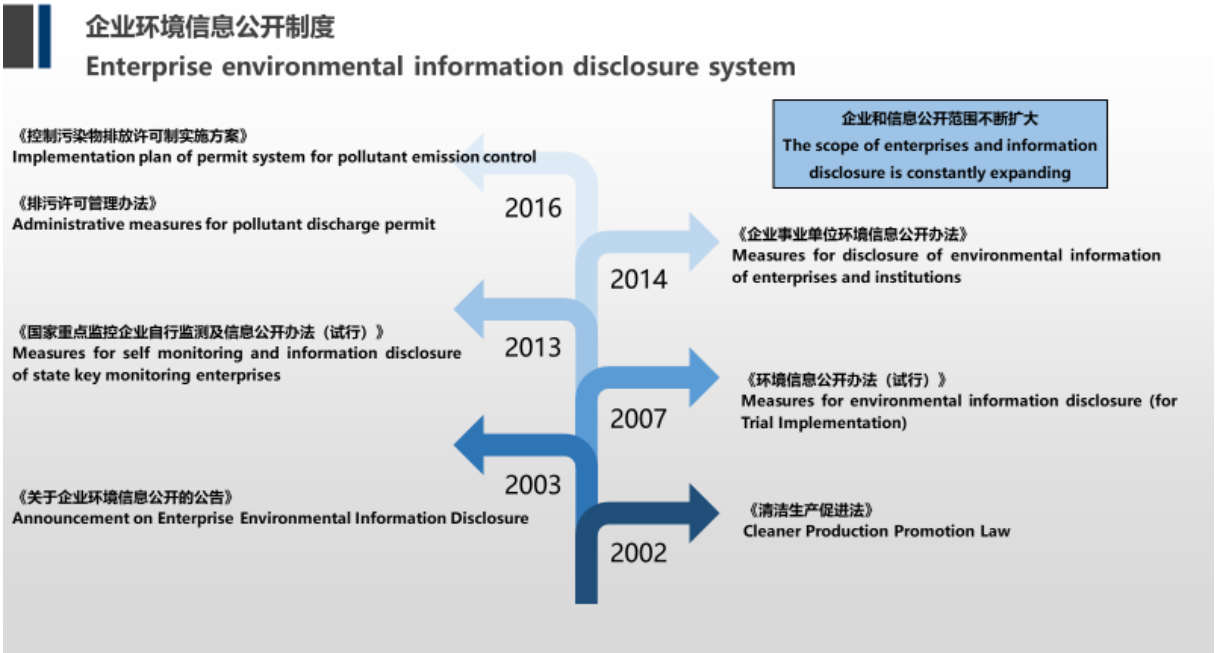

- In Jilin, the requirements cover eight key large emitting sectors, and the threshold is also 26,000 tons of $CO_2e$. Enterprises should disclose emissions of carbon dioxide and methane. The inclusion of methane is unique to Jilin.


- In Zhejiang, power sector and listed companies that are included in the emission trading system are required to take the lead in being the first to disclose information. They need to use a specific registration website for disclosure, so it's more like reporting to government rather than using your own website or reporting process.

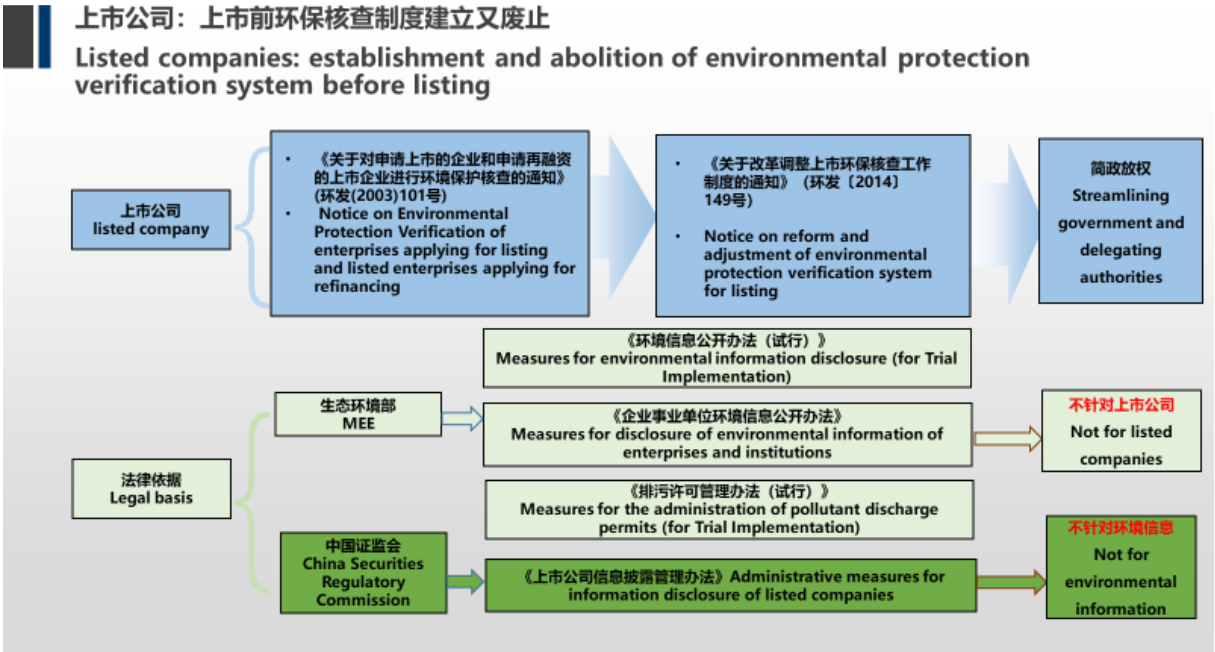



- Apart from provinces that have issued specific measures on GHG information disclosure, the central government is also including information disclosure in the KPIs of local governments. Therefore, all provinces will report the progress of their work on disclosure in their annual progress reports.
- Apart from those five, the remaining provinces also carry out work on information disclosure. In Beijing, the headquarters of China Huadian Corporation published a white paper involving a systematic approach to information disclosure. In Tianjin, food and design companies are required to make disclosures. Heilongjiang required large enterprises (e.g. the Churin Group) to publish Corporate Social Responsibility reports, with specific disclosure on GHG emissions and control measures. In Shanghai corporate carbon emissions information is linked to the public credit information platform. Jiangsu requires some companies to make centralised disclosures on the website of their parent company, rather than individual subsidiaries. In Fujian, the disclosure is linked to companies' credit rating. In Henan, companies disclose their carbon emissions-related work in the dedicated ESG part of their annual reporting. In Guangdong, all covered enterprises must disclose their total emissions and compliance situation. In Hainan, a GHG emissions reporting platform has been established with company information. Yunnan has set up its own carbon asset management agency, and in Gansu, the city of Jinchang is serving as a city-level carbon trading pilot, and has released its own emissions trading methodology, and specific requirements for companies.

- In a broad sense, the requirements for environmental information disclosure by enterprises have developed over time. The regulations have become more detailed and the scope of coverage has grown.




- For listed companies, there has been a change in requirements. In the past, companies needed to pass an environmental inspection before their IPO. But later, in order to streamline the process, this requirement was abolished. At present, the MEE has published environmental information methodology for industry, but this does not include listed companies. The information disclosure requirements of the China Securities and Regulatory Commission also does not address environmental information, so there is a regulatory gap here.



- The Ministry of Industry and Information Technology, in relation to green production and supply, requires that if you want to be labelled as a green industrial enterprise or supplier, you should disclose the company's energy conservation and emissions reduction information, supplier information, and social responsibility reports.

企业绿色供应链管理评价指标体系中的碳信息披露指标
Carbon information disclosure index in green supply chain management evaluation index system

| 一级指标<br>Primary indicators | 二级指标<br>Secondary indicators | 指标类型<br>Indicator type |
|---|---|---|
| 绿色信息披露<br>Green information disclosure | 披露企业节能减排减碳信息<br>Disclosure of energy conservation, emission reduction and carbon reduction information of enterprises | 定性<br>qualitative |
| | 披露高、中风险供应商审核率及低风险供应商占比<br>Disclose the audit rate of high and medium risk suppliers and the proportion of low-risk suppliers | 定性<br>qualitative |
| | 披露供应商节能减排信息<br>Disclosure of energy conservation and emission reduction information of suppliers | 定性<br>qualitative |
| | 发布企业社会责任报告（含绿色采购信息）<br>Release corporate social responsibility report (including green purchasing information) | 定性<br>qualitative |

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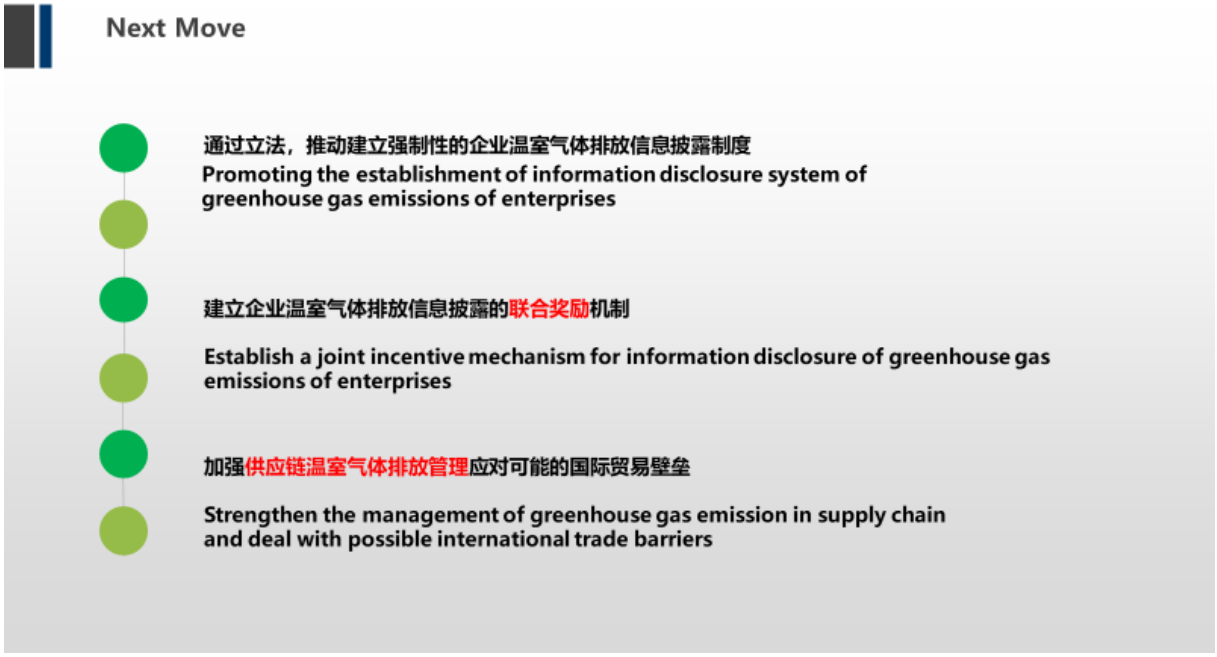
- Internationally, South Korea has just updated its emissions trading law to require emitters to disclose allowance and emissions information. In 2015, France issued its Energy Transition for Green Growth Act, requiring investors to disclose on climate change risk information. A review in 2019 found that most insurance companies had already made climate change-related disclosures, focussed mainly on climate risk. This will affect whether companies should make green investments, and cause insurance companies to establish thresholds and standards based on climate risk.
- In Australia this year, a 23-year-old university student sued the Australian government for not adequately disclosing climate risk-related information on the issuance of government bonds. In another case in 2017, shareholders in a bank sued it for not disclosing climate change risk. As a result, the bank updated its CSR reporting to include climate change risk.
- The has also been working on developing climate change legislation. Currently the regulations for carbon trading are being drafted. In the future, there will be more responsibilities for enterprises to disclose emissions, which may also lead to related lawsuits.
- For the next step, regulation on the compulsory disclosure of information by enterprises should be gradually established, followed by a corresponding incentive and penalty

mechanism. At the same time, information disclosure should not only be connected with the carbon market, but also with the management of GHG emissions throughout the supply chain. The EU's Green Deal will expand the role of the EU ETS and in the future may introduce trade barriers through a carbon border tax. Therefore, we need to strengthen information disclosure in China's supply chain to deal with future trade barriers.




- Q: Is there any update on the rules and regulations on climate change?
- A: The climate change legislation will be passed by the National People's Congress (NPC). It has been in the works for over 10 years, having first been proposed in 2009. The Climate Change Department, then under the NDRC, began working on the scope of the legislation, and in 2015 a draft was produced and a round of consultations conducted. Currently there are 8 chapters and over 60 clauses in the draft. It was included in the 2016 legislative plan of the State Council. Also included was the Regulations on Carbon Emissions Trading Management. The NCSC has helped with the drafting and also the underlying reasoning. However, the central government's priority is that regulations will be developed first. Minister Huang recently visited our centre and, having previously overseen the regulatory department, he mentioned that the MEE will pay great attention to legislative work.
- The regulation will need to be passed through the Legislative Affairs Department of the State Council as well as the Ministry of Justice, but also involve soliciting opinions various stakeholders. The views of these stakeholders are not particularly unified, and the legislation is being constantly reviewed and improved.

- We want to build a 1+*n* carbon trading system. Apart from the legislation with the NPC, the 1 represents the regulation and *n* represents departmental rules and regulatory documents. The previous carbon trading regulations were out of date. Since jurisdiction shifted to the MEE as a result of the institutional reform, there is an opportunity for the laws and regulations to be amended. Perhaps because the departmental regulation is at a lower level, there is less resistance to amendments. Also, the *n* includes guidelines and rules at the ground level. We have the drafts for all of these documents, but they are still going through the legislative process. The different parties and stakeholders to the legislation will hold consultation meetings, including seeking the opinions of industry. The regulation must be produced first, and then the legislation can come out.
- Prior to the institutional reform, there was a conceptual framework for this process, however after the reform it needed to be adapted to the legislative system of MEE, and then incorporated in to the Ministry's management systems. For example, previously the third-party verification process was taken from the CDM. Now the MEE has its own legal enforcement team, so what is their role in verification? Do the results of the verifiers need to be assessed? If so, will there be efficiency issues between the two processes? In additions to these core issues, some new issues have arisen after the institutional changes, and are undergoing consideration.
- Another issue is capacity building, because while at the national level all responsible staff were transferred to MEE, at the local level about half of the relevant staff are from the environmental protection system where they have been responsible for monitoring a range of pollution and need to build understanding about climate change. We have held many training sessions and the capacity of staff is improving and being mainstreamed. Many provinces have only just established a dedicated division of climate change. So there is an issue around if the law comes out in a hurry, who will implement it? Who will do the accounting and ensure compliance?
- Q: The EU ETS has a website for information disclosure which shows data for all enterprises, including verification and compliance. For China's national ETS, will there be such a dedicated platform for information disclosure?
- A: For climate change, at the national level there was a pause. In April 2018, when responsibility moved from the NDRC to the MEE, there were some gaps in relation to the three-stage ETS implementation plan, and it took about seven or eight months to set up a

dedicated website. The information was very fragmented and it was very difficult for companies to get access to information. Even for provincial or lower level officials, if they wanted more knowledge about climate change or the relevant policies and regulations, a lot of the information had to be consolidated.

- The five provinces that do have explicit disclosure requirements, all have their own rules. It could involve disclosure on the company's website, in a newspaper, or on the government's website. The thresholds for disclosure may also be different. So it is necessary to establish a unified system in the national ETS, with consistent methods and benchmarks. This is the simplest and easiest aspect to consolidating information disclosure, because there are no conflicting interests. Everyone knows that we need to do this, and we will reach consensus.
- This past April, the NEA published the Energy Law. There are two relevant articles about the government's responsibility on disclosure of energy consumption information, as well as enterprises' responsibility. Perhaps this can be used as a reference for the climate change legislation and regulations, as it will likely involve a similar level of detail.
- Q: Regarding the Ministry-level rules and regulations, which will come out first? Will regulations be issued this year?
- A: We have drafts for all these documents, but I cannot give a prediction of when it will be released. The regulation is high on the agenda but there are a lot of procedural issues. It is not decided by MEE alone, as it concerns the Ministry of Justice, which also needs to solicit opinions from various parties, such as the Leading Group on Energy Conservation and Emissions Reduction. For the departmental regulations, the changes will be small, but they also need to go through the administrative procedures. Many aspects are currently being deliberated on, including the rules and carbon accounting methodology.
- Q: If the regulation is not introduced, can we still launch the carbon market?
- A: I think it depends how you define launch. In 2017, we already launched the pilot national ETS, but the next point may be the release of the regulations.
- Q: By launch I mean when companies have compliance obligations.
- A: Once the regulations come out, companies will have a legal obligation. But we already have administrative obligations which apply even before the regulations are released, and can encourage performance or administer penalties. We have looked at the example of Shenzhen, where there has been litigation in relation to carbon trading. A penalty was

issued by the Shenzhen government, which the company refused to accept and sued the government. This provides a practical example of the legal basis for the carbon market.

## Effect of Carbon Trading on Commercial Bank's Credit Risk

*Zhang Jingwen, ICBC Modern Finance Research Institute*

- I will talk about stress testing conducted by the Modern Finance Research Institute at ICBC, including: 1) stress testing of environmental risks, 2) research on carbon trading stress testing, and 3) recent developments at our institute and the roadmap for future work.
- We started working in 2015 on environmental stress testing, to understand whether there was any impact from environmental risk on the bank at the time, how it transferred from entities to the bank, and how significant the risk was. The research team didn't have a mature system that could be referred to in China or abroad, so we conducted an empirical study and built a theoretical framework. We think there are three channels for the transfer of environmental risk to commercial banks. The first is credit risk, whether due to change of regulation on environmental protection, the impact of natural disasters, or the cost of allowances in the carbon market. The profitability of enterprises will be affected and therefore create credit risk for commercial banks. In addition, we have seen many cases of pollution accidents happen in China and overseas where there are consequent liabilities on commercial banks. There are also some reputational risks involved.
- Therefore, we conducted stress testing in recent years. From 2015-2017 we were mainly concerned with policy change, and analysed high-polluting sectors such as coal power, cement, steel and electrolytic aluminium. From 2017-2018 the main concern was natural disasters such as drought. Last year we conducted stress testing on carbon pricing, together with the China Beijing Environmental Exchange (CBEX). CBEX is an important institution in the development of China's carbon market, and has much relevant experience. In ICBC, we have a lot of customer data, we have run a mature internal credit risk rating model for many years, so our two institutions jointly conducted such a research.
- Our stress testing of thermal power companies in relation to carbon trading can be divided in to five steps. First we select some suitable examples of the bank's customers. In this study, we selected about 1,500 customers. The second step is to select stress factors and the indicators on the enterprise side; in other words, what factors do we use to describe the environmental risk? In this study, the stress index is measured by the added cost of electricity. On the commercial bank side, our pressure indicator is the *PD* (probability of default) of our clients. Fourth, we developed three future scenarios and built a model to

test the impact on the cost of electricity per kWh. Finally, we performed the test and analysed the results.

- In terms of pressure factors, we selected four: the carbon price, industry benchmarks, the proportion of paid allowances and the application of technology to reduce emissions. Considering these factors, we modelled the added cost per kWh, and found that the first three factors lead to increased costs. The adoption of emission reduction technology one hand increases costs, but over time it can reduce costs to certain extent.
- Setting the scenarios is key to the stress testing. We had to reflect reality as much as possible, including possible future situations. There are also technical considerations. If the stress factors are too high or low, then the stress testing will not be meaningful. The three scenarios are near-term, medium-term and distant scenarios, with pressure increasing successively. For the near-term, we modelled China's national carbon market, for the medium-term we modelled the EU scenario, and for the distant scenario we modelled long-term carbon trading where the carbon price is at a reasonable level for a period of time. Then for each scenario, we assigned specific values for the carbon price, industry benchmarks, proportion of paid allowances, technology costs and emission reduction effects, and calculated the added cost of electricity. Then we put the results in our existing model to calculate the change in the industry's risk rating.
- We produced three conclusions. The first is that carbon trading will have a direct impact on the financial performance of enterprises. Under the 3 scenarios, the cost of electricity from thermal power will rise by 0.23 fen (1/100 yuan), 1.89 fen and 6.7 fen per unit of electricity. The second is that carbon trading will increase the credit risk of commercial banks. In the mild and moderate scenarios, we found that some companies will have their credit ratings downgraded by one level, while in the severe scenario there was a two-level downgrade. The third is that the overall impact of carbon trading on ICBC's credit risk is controllable, because we have already reduced the scale of exposure to industries with high levels of pollution and over-capacity. At present, most of the thermal power companies in the asset portfolio are relatively high-preforming companies, their overall environmental performance is good relative to the industry, and some customers may even profit from trading in the carbon trading secondary market.
- The main recommendation for financial institutions is that they should optimise their portfolio structure. Provide more support for the clean and renewable energy sector.

Regarding thermal power, perhaps the most important focus should be on intelligent transformation to smart thermal power operations, providing improvements in energy efficiency. After several years of adjustments to our energy portfolio, ICBC's loans to wind and solar energy has now surpassed that for coal-fired power. In recent years, 60-70% of new loans in the power sector have gone to wind power and solar power.

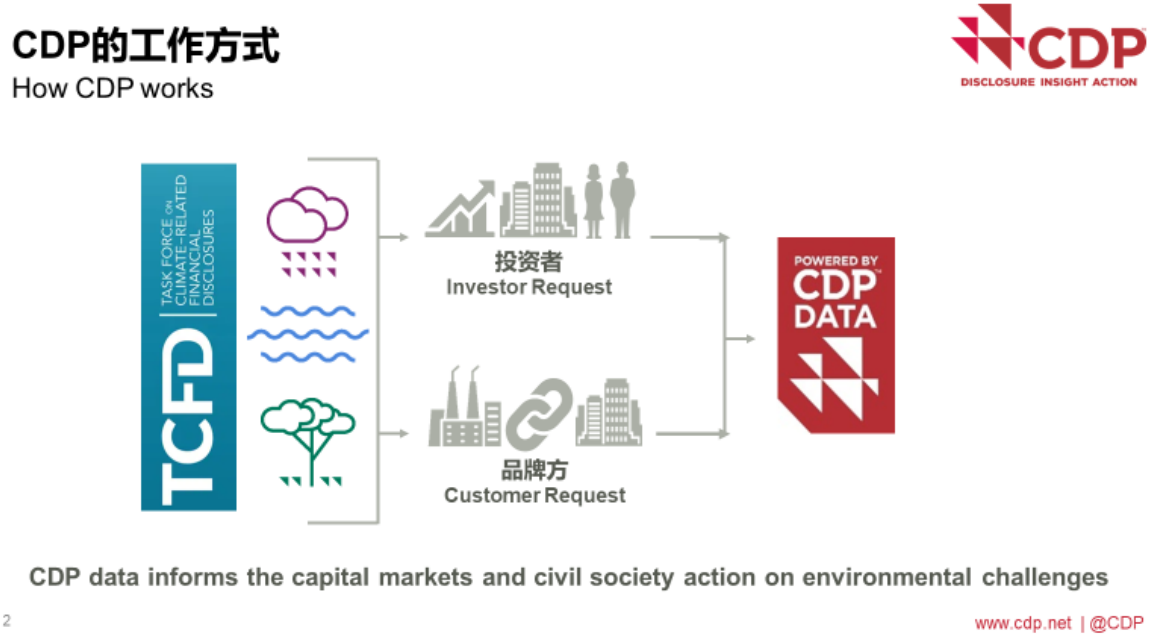
- Our recommendation to policymakers is that when formulating carbon trading policy, they should consider the impact on both enterprises and the financial sector. We encourage financial institutions to do stress testing based on carbon trading in order to provide more reference material for policy making. We found that the ratio of paid allowances is a highly sensitive factor, and therefore more attention should be paid when developing policy.
- We are now working with North China Electric Power University, to carry out a stress test in the coal power industry. This is different from previous stress tests, and is very strict. Before we did stress testing on single-factor calculations, either policy or carbon trading. This time all factors are included in one model. We consider increases in taxation, reduced subsidies, carbon trading and the replacement by renewable energy as representative of transition risks. The accuracy of the research has been improved compared to previous efforts, as we are able to analyse to the region and to the unit level, while maintaining the previous level of accuracy by borrower. We also considered the impact of power transmission, peak shaving and macroeconomic trends. This report will be released at the end of this year or early next year.
- Q: When you say thermal power, is it just coal power, or do you also include gas and nuclear power generation? If it's just coal power, have you done any stress testing on gas and nuclear power generation?
- A: In 2019 our stress testing covered thermal power including coal power and gas power generation, but not nuclear. The work we are currently doing is focussed on coal fired power plants only.
- Q: Our company is quite small. We have one department taking care of all transactions and trading in our group. Your methodology can be applied to our operations. We are used to considering the marginal cost, which I personally think is the bottom line in order to trade electricity. In fact, we still need to consider many issues on top of this. For example, it may not be particularly obvious when we are doing carbon trading, but it is obvious in relation to power trading. When we are formulating our offer price, or conducting

transactions, the marginal cost is the bottom line. No matter how we price the electricity, the marginal cost will always be the break-even point. In fact, we also should include other fixed costs. With the current transaction volume, however, it is not suitable to include fixed costs, so we just use the marginal cost. If the increase in cost is 6-7 fen, as described in the presentation, then power companies cannot make any profit in the market. At best, they may not lose money. So if the carbon price is really something like 50, 100 or 200 RMB, whether it's the Big 5 power companies, or one of the larger local companies like us, Zhejiang Energy Group or Guangdong Energy Group, they will have strong opinions. We cannot consider only the carbon market. We need to consider all markets. If you look at the power market now, 6 fen would cause a situation where power companies can no longer operate. Therefore, the price should not exceed 30 RMB. If it is lower than 30 RMB, then this can be accepted by the power industry. Because after all, the power industry is a national asset. Whether it is overseen by the central or provincial level SASAC, the rate of cost increase is an evaluation criteria for annual assessment. If this cost is excessive, it will be unacceptable for the leadership of any SOE.

## TCFD and ESG disclosure and their implications for the carbon market

*Sung Wanyu, Programme Manager, CDP Supply Chain*

- TCFD is a quite a new topic, and many listed companies, especially if they are listed in Hong Kong, may be guided by the Hong Kong Stock Exchange towards TCFD and ESG disclosure.
- CDP represents about 515 investors globally, most of which are large pension funds and financial institutions. We also have over 140 big clients such as Walmart, ICT and automobile companies. They invite listed companies that they invest in to use CDP's questionnaire and scoring system to demonstrate their management of climate change and carbon emissions, as well as water resources. CDP is now entering the field of natural resources, forest and land management, and providing CDP's network access to that data. In 2019 we collected information from more than 8,400 companies around the world, representing about 50% of the global stock market value. Many companies are willing to work with CDP because this is indeed able to improve their performance and create confidence in the eyes of financial institutions or their clients.

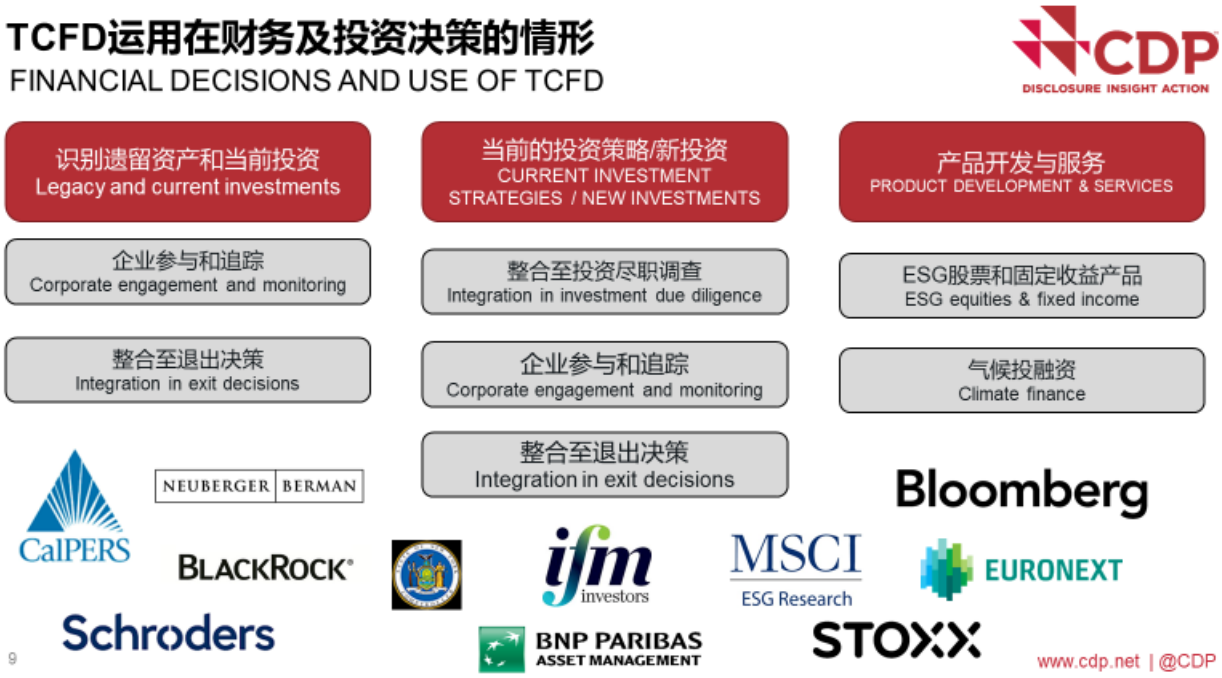



- How is this data related to the green transition of the economy? We can see that a lot of low carbon solutions, like energy efficiency, need funding. Investment needs reliable supply of information. With market transparency, investors can better identify the target for their investment. So we help investors gain access to this information. Companies providing information increases the transparency of the market, and only in this way can we facilitate the flow of finance towards green transformation.
- 2019 was an important year for green finance. In these two years, there has been a clear trend in policy development. In 2016, Guiding Opinions were issued on establishing a green financial system by PBOC, MOF, NDRC, MEE, CSRC and CBIRC. The document identified areas of green investment, including the establishment of green bonds, as well as industry standards and guidelines. It also provided incentive policies, as well as provisions for information disclosure. As mentioned by Dr Tian, this is in line with the work being conducted by the central government to encourage extensive information disclosure. The other key aspect was in relation to innovative financial products such as equities and securities. In January 2020, CIBRC also issued guidelines on promoting high-quality development of the insurance and banking sector. The guidelines mentioned the integrate information disclosure on environmental and social governance in to the whole process of credit provision. This represents a significant advance in the promotion of the development of a green financial system, and provides signal to listed companies.

- Internationally, many reporting frameworks have been implemented, and an integrated disclosure system developed. In 2015 after the Paris Agreement was signed, and the UN included climate change in the Sustainable Development Goals (SDGs), many international organisations, including CDP, proposed their own ESG reporting frameworks. Later at the G20, finance ministers started a dialogue with regard to central banks and financial regulators. They launched the Financial Stability Board (FSB), part of whose work is related to climate-related risks. Climate change is a non-diversifiable financial risk for financial institutions. Therefore, financial institutions need companies to provide quality data that is comparable and standardised in order to help better analyse their degree of climate change risk. There have been efforts to promote the harmonisation of these reporting frameworks, leading to the establishment of the Taskforce for Climate-related Financial Disclosure (TCFD). The TCFD developed a series of recommendations, and worked to promote synergies between standards including CDP, SASB, CDSG, PRI and GRI etc.
- The TCFD framework divides climate risk in to two aspects. One is transitional risks, which includes regulation, technology and markets. The other is physical risks, including disasters like sea level rise and typhoons. It is also recommending that companies should develop a corporate governance strategy, with quantitative risk management indicators and targets, including the company's carbon emissions. Financial institutions are starting to inquire not only about the quantitative information but also the quality of a company's risk management.
- Increasing numbers of stakeholders are paying attention to the fact that we must build a sustainable and climate-friendly financial system. We see many contributing elements, including that regulators are increasingly supporting sustainable finance, such as through the NGFS, which is led by central banks and financial regulators, including from China. Also, the climate related initiatives by the UN, where Chinese financial institutions have joined the UN's Principles for Responsible Investment (PRI) highlighting that financial institutions are increasingly supporting companies to implement ESG and to use the TCFD framework.
- Many companies have also adopted voluntary platforms, including CDP, GRI and the Dow Jones Sustainability Index (DSJI) to report on the risks and opportunities they have identified in relation to ESG. It's good that these stakeholders have become more aware, but we also see some limitations. Doing ESG work may feel good for these companies, but what is the return on investment? How do we create an incentive mechanism? Another

issue is that while financial institutions and the TCFD encourage companies to do the disclosure, if the companies don't have the people to implement it and the management doesn't have the awareness, there will be a resource gap and lack of an integrated approach to managing it. In addition, with so many reporting frameworks there is indeed a lack of standardisation, and companies often feel that this is a barrier. So, we need to consider how we can integrate the reporting frameworks.

- Up until 2020, ESG investment products were not mainstream. But after COVID-19 this year, we have seen much market data that shows products based on ESG or evaluated by ESG standards, whether its securities or equities, are attracting more capital. This is expected to continue to grow over the next 10 years.
- At the policy level we see integration of climate change risk assessment, and many new policies being introduced. We believe that the promotion of ESG in the future help to will better reflect environmental and social costs during the next 10 years.
- Companies want to learn more about ESG and carbon management, and how can they integrate this into their own internal management systems. Before they asked why should we do this? Now they tell us that they want to do this.
- In relation to reporting, standardisation is being worked on internationally, including by CDP, SASB, CDSB and other frameworks, such as through the establishment of the Corporate Reporting Dialogue, so hopefully in the future companies will not get lost amongst the various frameworks, and it will act as a network for them to gain greater understanding.
- TCFD can be used in financial management and investment decision making. More and more financial institutions are using company ESG reports or a data platform such as CDP to improve their due diligence assessments prior to investing in a company. The information may also inform their vote at a shareholders' meeting, or in discussions with executives on how the company can improve its management of ESG. For under-performing companies, they can consider eliminating them from the portfolio.




- Another function is to facilitate the development of products and services. CDP has done a lot of work here to better integrate our data in to the management of stock portfolios, rating of funds, or issuance of sustainable development-related loans.
- Our major work is to help companies better understand through CDP, how to integrate the TCFD into the management of the company. We make training sessions and free disclosure support available to enterprises.
- The disclosure period for 2020 has just ended, and it represents a big improvement from 2019. We invite more than 300 listed companies each year to disclose via CDP. Many of them are not covered by the carbon market. In addition, 1,300 companies are invited by their clients to participate in the CDP survey. In 2019 we had 48 listed companies and more than 1000 suppliers respond to CDP. This including four Chinese companies selected to join the CDP A List, namely China Mobile, Lenovo, Huawei and Sateri. Last year it was more than 40 enterprises. This year I can tell you it's already more than 60 companies included, but of course it's still a relatively small number of investors, and the level of awareness still needs to be improved. I think that domestic suppliers are very active in responding to requests from clients to be included.
- Whether it is TCFD, ESG reporting or CDP, how can it be integrated with the carbon market? We have paid much attention to how data is used in climate-related investment and financing, within China' policy framework. There are already many positive policies and standards being introduced, including in relation to environmental disclosure. Whether

the standards relate to the carbon market, green credit or bonds, guidelines for disclosure will be involved. CDP is following this closely and consulting with relevant stakeholders. We have seen that carbon trading is a very important means of mobilising enterprises and capital. For those not yet covered by ETS, we would like to help them better establish internal carbon management systems, build capacity and be better prepared for the future policy environment.

- Finally, the key to implementation of policy is information disclosure, no matter whether it's carbon trading or climate investment and financing, or green supply chains. Deeper international cooperation depends on information. We hope to cooperate with more of the experts and private sector colleagues here to promote this work.
- Q: I actually deal with CDP. Every year, CDP sends a letter to the Secretary of the Board and they send it on to me. I was told that we have to be compliant with the regulations. At the same time, we also have to follow the rules of the stock exchange where we are listed. So my question is, given that we are a covered entity and we have already disclosed to the exchange, what is the motivation to make such disclosure with CDP? I notice that China Mobile received the highest CDP rating in 2019, but if this is voluntary disclosure, what is their motivation for doing this?
- A: If it's only for compliance, then I think there will not be sufficient motivation. Most of the newly added enterprises are listed on the Hong Kong Stock Exchange (HKEX), and in that case, there are indeed very clear guidelines, i.e. that they should disclose according to the TCFD framework. CDP acts more like a free platform, where enterprises can refer to our guidelines. CDP has a collection of benchmark data, so you can use us as a tool for internal benchmarking. In the case of China Mobile, we have been following the company for more than five years, and it has received positive attention from international investors. They also do international roadshows to attract strategic partners, such as European pension funds, and such investors are concerned with long term development. They are better able to communicate with these investors using the CDP platform.
- Q: In relation to supply chain management, we sometimes act as agents for freight companies like DHL and FedEx. They also send me an email each year asking us to disclose, for example data in relation to our aircraft. They are our customer, and they ask us to send very specific information to them. So what is the motivation to disclose again with CDP?

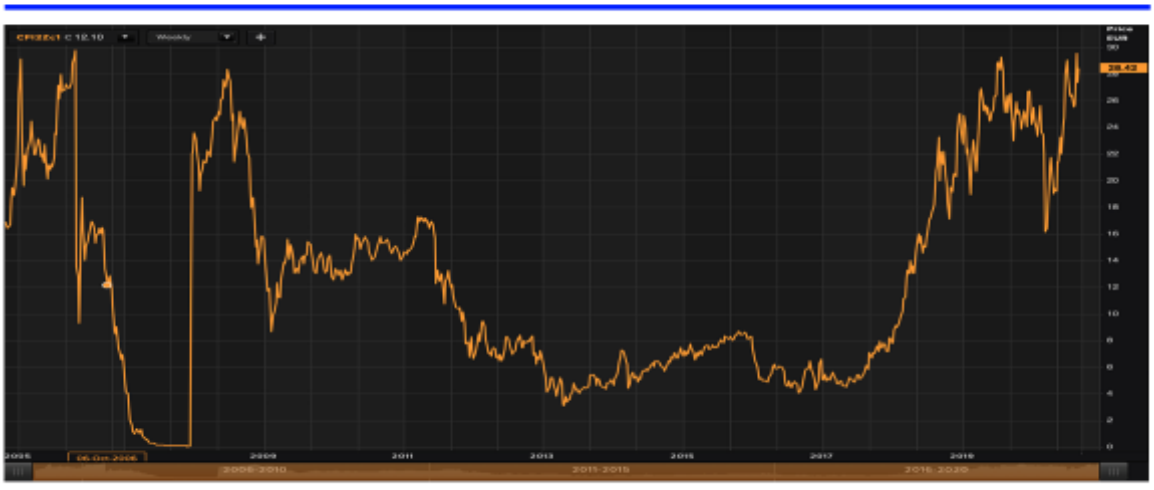
- A: If you search the website of CDP, you can see that many of your peers are making disclosures with CDP. For the transportation sector, especially in the automotive industry, major automakers all require suppliers to provide their CDP submissions when bidding. In the past it was more of an encouragement by clients, but now it becomes necessary, as they will give them extra points in the scoring if they make a disclosure with CDP. This is gradually being integrated into procurement standards.

## Transparency and carbon finance: market analyst's view and experiences from the EU ETS

*Yuan Lin, Refinitiv*

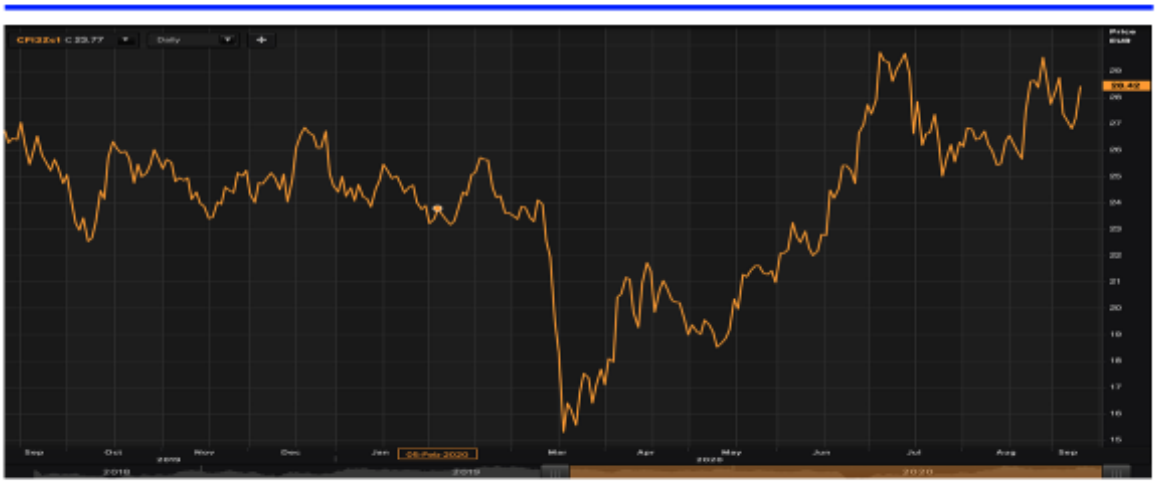
- We can learn much from examining the pricing trends and the influencing factors in the EU ETS for the Chinese ETS, especially in relation to the sensitivity of prices to various signals in a mature market.
- The chart below shows the price trend since the establishment of the EU ETS. While the ETS started trial operation in 2005, it officially began operation from 2008, and so 2008-2012 can be considered as the first phase. The second phase ran from 2012-2020, and the third phase is starting from 2020. In the first phase, we encountered the financial crisis in 2008, and saw a significant drop in emissions and energy consumption, leading to an over-supply of EU allowances (EUAs). For many years, the carbon price remained low. Although the EU tried to control supply, it was not very effective. Then in 2018, the price picked up significantly due to the EU adopting market reform measures. It was made clear that supply will be controlled, and a Market Stability Reserve (MSR) introduced. This has greatly boosted the confidence in the market, and during 2018-2019 the price rebounded sharply.

EUA Historic Price: Phase I to III



- This chart below is from 2020. A lot has happened this year, including the COVID-19 pandemic. The outbreak occurred in January; however, it was about a month later in Europe and by mid-March the EUA price saw a sharp drop from above 25 Euros to around 15 Euros. In April and May oil and natural gas markets also plummeted, reaching historical lows. But COVID didn't have a very long-lasting impact on the EU ETS. We can see a very strong rebound in Q2, and in July the price broke through 30 Euros, which is close to the historic high. We think that there are two reasons for this. The first is that after May, people began to return to work and school in Europe, so the demand for energy picked up. There was also confidence in the return of industrial output to the pre-pandemic level. Second, and most importantly, 2020 saw the transition from the previous phase of the EU ETS. Therefore, various signals indicate that EU climate policy will continue to tighten in the future, and the market has a relatively optimistic view about future market activity.

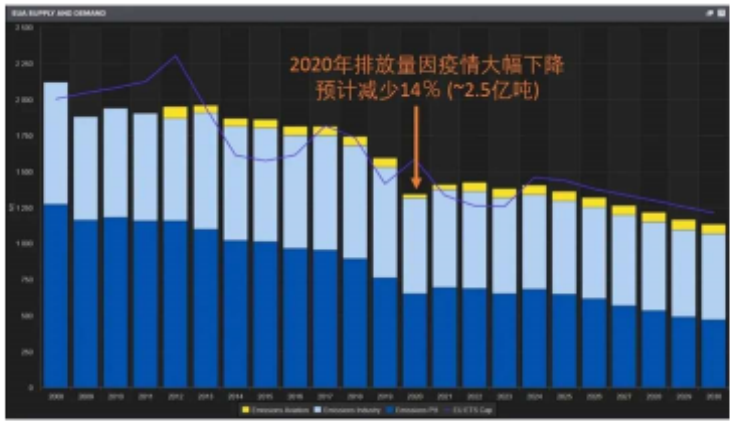
**EUA Price in 2020**



- The chart below shows supply and demand. In the EU ETS, supply and demand is the most direct influencer of prices. For example, in 2008 emissions from enterprises plummeted due to the financial crisis, and therefore the demand for allowances dropped causing a sharp fall in the price. This chart shows annual emissions from 2008 to 2030. Dark blue is electricity, while light blue is industry. Since 2012, aviation has also been included, represented by the yellow. The line represents the allowances. So the columns represents demand, and the line represents supply. From 2008 to last year the values here are the actual, while from this year onwards it represents our forecast. The emissions are predicted based on historical experience, and the accuracy rate is over 99.5%. So we can see that it is a very direct relationship between the supply and demand. If the blue line is higher than the column in any one year, it means that there is oversupply, and vice versa.

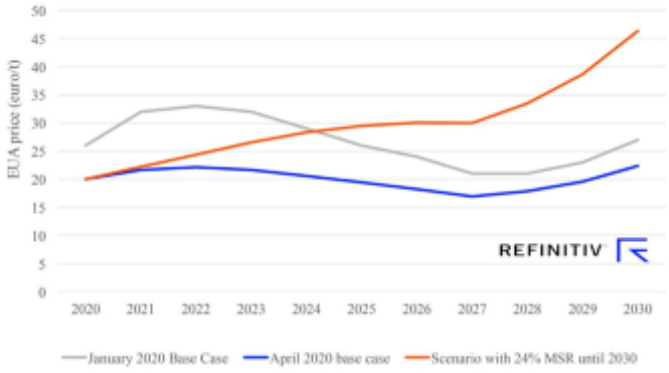
From 2008-2012, due to the financial crisis, the demand from enterprises reduced a lot. At that stage, the ETS did not have any flexible adjustment mechanisms, so there was over-supply of allowances. After the new phase started in 2013, the EU adjusted the ETS design, reducing the supply of allowances and providing a certain level of support to the market, and therefore the EUA price did not continue to fall further. However, in the middle of this year, it seems that there was again and over-supply of allowances as a result of COVID-19.

**Supply and Demand**




- Another factor is the 2030 goals. Currently the goal is to reduce emissions by 40% over 1990 levels. But at the end of this year, the EU Commission will release impact assessment on increasing that target to 55%. The EU Parliament will also discuss the potential for raising the target. We have previously conducted some estimates. If the goal is 40%, then from 2021 to 2030 the cap on allowances needs to reduce by 2.2% per year. If the goal is 55%, the cap needs to reduce by 3.8% per year. So, if the increased target is adopted, it will be good news for the market.
- Apart from the 2030 goals, the other major encouraging factor is the MSR mechanism. This mechanism acts a reserve pool of allowance. When there is over-supply, allowances can be removed from the market, and when there is under-supply, allowances can be released to the market, helping to maintaining allowances at a reasonable level. After next year, the EU Commission will discuss changes to some of the parameters, potentially tightening the market. If the market is tightened via the MSR, our forecast is for the EUA price to follow the orange line in the chart below. In this case, the carbon price reach more than 40 Euros after 2030. Otherwise it will remain at about 20 Euros and above. So this could potentially mean further good news for the market.

## Market Stability Reserve




- In addition, there are other factors affecting the carbon price, including energy prices. The stock markets in Europe and US also affect the EU ETS. The role of data and analytics providers like us in the market is a bit like Archimedes saying, “if you give me a lever long enough, and a place to stand, I shall move the whole world”. If you give us more data transparency, we can give you better analysis about the market and forecasting, to provide better guidance to the market.
- Here I would like to show you what we can do in the EU market. The chart below shows the real-time supply and demand in the electricity markets of each country.

## Carbon Supply & Demand

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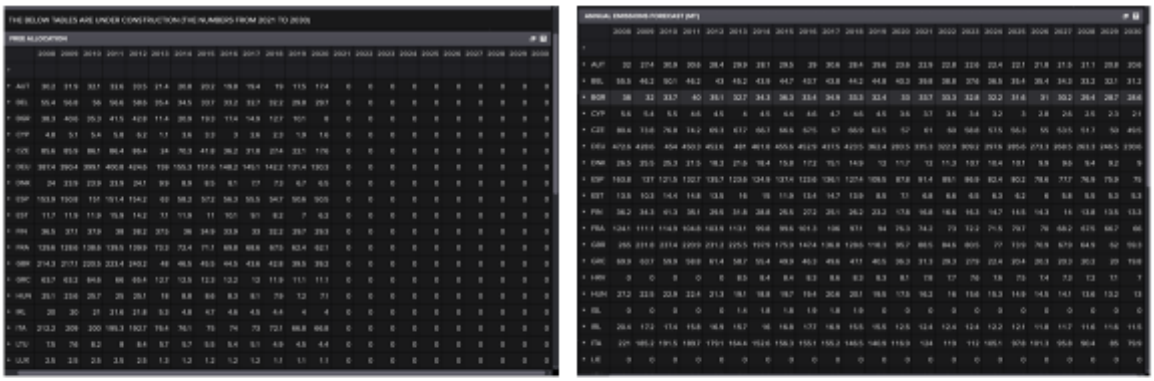
- The chart below is carbon data. On the left is the issuance of allowances for each country, and on the right is the carbon emissions that can now be forecasted out to 2030.





- With this data we can provide policy interpretation, and review and forecast of the market. We hope that in the Chinese market, there can also be such transparency of data as in the EU market, so that our analysts can also provide the market with high-quality review and forecast of the market, thereby providing better guidance to investors.

**Discussant:**

*Huang Qianru, Shanghai Clearing House*

- The Shanghai Clearing House has worked together with the government agencies and carbon exchanges on the development and operation of several of the pilot carbon markets. So why is a clearing house involved? Because we provide specialise clearing and risk management services to the financial market. For example, if a securities company has business with a bank such as foreign exchange or bond trading, then the business is cleared in our clearing house, and the order of magnitude of this trading is hundreds of times that of the carbon market. Clearing houses play an important role in the EU ETS. While the transactions take place on the exchange platforms, ultimately the work is done by the clearing house. So, behind all the exchanges, whether it is the Intercontinental Exchange (ICE) or the European Energy Exchange, they all have dedicated clearing houses. The Shanghai Clearing House plays the same role in the Chinese market.
- At the beginning, we were not involved in the carbon spot market, because when it started in 2013 everyone had their own system. We began working together with the Shanghai Environment and Energy Exchange on the development of derivatives. We have a different point of view from enterprises. Companies pay attention to allowance allocation; e.g. do we have enough allowances? Will the carbon price represent a major burden? Or other similar questions. Our concern is that, since the carbon market defines itself a market, it needs to develop in a market-oriented way to be effective. Otherwise, it will have a direct consequence on the market. The carbon price in China currently is not market-based, as supply and demand is not the decisive factor on the price. For example, China regulates the oil prices via a price floor and ceiling. That's why, while the price fluctuates a lot in the international crude oil market, China's domestic prices are very stable, and you can be confident that the price will not drop. Similarly, each carbon market has an initial price, and apart from Guangdong most pilots allocate all of the allowances for free. So at the beginning of the pilots, the question asked most by enterprises, is how the allowances are priced? Because for transactions, the traders need to have some expectation on the allowance price. Otherwise they cannot judge how much they plan to buy or sell. In the early years, we were very concerned about this issue. Now everyone has a concept of the marginal cost of abatement. But that is not something easily calculated. It is not a simple measure of technology change. The cost of reducing emissions should certainly be part o the calculation, but it should also consider the market value of allowances. Currently, as

the allowances are all allocated for free, we don't have a concept about this price, which is a very important factor in why the ETS is not very active. People don't know how to trade. In the Shanghai ETS, there was a period when the policy was relatively stable. We saw a clear influence from the supply and demand on prices. At one point, the market was over-supplied, so the price dropped to 4 yuan/tonne. But later when the policy changed, the price became more stable.

- We're focussed on the market infrastructure. Let's say the exchange is our front desk, in the background is the registry system as well as agencies that provide investment and reduce risk. If the overall design of the system is sound, then we will have a basis for enterprises to engage in trading, because the dynamics and direction of the market will be clearer. Only when the market is genuinely effective, like the EU ETS, will there be a price that is considered fair by covered industry. Otherwise, some will always consider that the price is unfair, for example that it is too high for the power sector and too low for other sectors.
- In terms of the connectivity between pilot markets, I don't think that it can be solved in the short term. In terms of development of the market itself, the development of diversified trading products is one of the most important issues in our eyes. I remember when the plan for the national ETS was introduced in December 2017. Our first reaction was that there would not be liquidity in the market, because from a trading point of view, if only the power generation industry is included, the demand will be from only one source. In addition, if only covered enterprises can trade, the demand will be entirely predictable, and the trading limited. So, we have to make sure that the national market is diversified as soon as possible.
- The Chinese market is different from the EU ETS and markets in the US. The EU market is a mature market, where the financial market is highly developed. The prices for electricity, energy and basic resources are market oriented, and the corresponding derivatives are highly developed. You can look at the carbon price as part of a portfolio together with power prices, hedging and investment. In the EU, the carbon price can be hedged like a financial derivative tool in order to manage costs. It just adds one category of asset under management, and is not particularly complex. But in China it's quite the opposite. A lot of covered entities are State Owned Enterprises, and they are not used to using financial derivatives to control costs. Many companies that import and export commodities face

foreign exchange pressure. They are not allowed by the government to use hedging strategies to reduce costs. They often need to convert RMB into foreign currencies to conduct procurement. In this case, if the raw material price is high, the foreign exchange cannot be managed and the risk is amplified. If you cannot conduct some basic application of derivatives as a tool to manage your costs, then carbon pricing cannot be used as a tool as well. The carbon market is created by the government, it's not concrete, and the allowances are provided for free. So, this presents a dilemma. If you actively manage your portfolio you may face issues, if you don't manage it you will face issues. The regulators in China should take more account of financial considerations. Without considering financial factors, it's not a real market, and we cannot use trading to get a fair price on carbon, reduce emissions and promote investment.