ETS and the power sector in China and other Asian countries: interactions, design, and operation

Meeting report

Overview

The Asia Society Policy Institute is convening a series of private dialogue meetings that brings together experts in emissions trading system (ETS) development from select Asian jurisdictions. This initiative seeks to support the successful design and implementation of national ETSs in Asia, while building foundations for future market connectivity at Asian and international levels.

This meeting, co-hosted with the Harvard Project on Climate Agreements and the Center for Energy Economics and Strategy Studies at Fudan University, was held in two sessions on 20th October 2021 by videoconference. It focused on one of the most important topics for ETS development in Asia – how an ETS can be used to support power sector decarbonisation, driving fuel switching away from coal to low-carbon fuels and renewables, and thus achieving significant cost-effective GHG emission reductions.

The sessions examined critical challenges including implementing power generation dispatch mechanisms that consider carbon costs to encourage generation from renewables and low-carbon fuels, and effectively passing these costs through to electricity end users to reduce demand and hence levels of generation. The sessions also explored the need to manage multiple policies – sometimes complementary and sometimes competing – that affect decisions related to the power sector and emissions abatement. Case studies on challenges and solutions were presented and discussed for China and Korea, with interventions from Indonesia, Japan, Thailand and other countries. Experiences from a major European power company on how the EU achieves an effective ETS design and operation as it pertains to the power sector provided additional insights.

The meeting also examined the initial performance of China's national ETS for the power sector in its first months of active trading (starting July 2021) and areas for future progress, as well as experiences and lessons from power companies in China from operating under the ETS.

The meeting agenda is provided in Annex 1. The participants included leading experts in the interaction between ETS and the power sector in Asia, as well as the USA and Europe.

Summary

Requirements for an ETS to effectively reduce power sector GHG emissions

There were some clear findings that emerged from the presentations and discussions at the meeting about the key requirements necessary for an ETS to effectively reduce power sector GHG emissions. These included:

- The ability to reflect ETS carbon costs in power station dispatch decisions. This provides the mechanism to drive fuel switching from coal to renewables and low carbon fuels via the wholesale electricity market.
- The ability to pass-through carbon costs to electricity prices. This provides the mechanism to reduce end-user electricity demand, and hence the level of electricity generation, via the retail electricity market.
- A strong carbon price signal, created by a high share of auctioning and ambitious cap-setting. This will drive fuel switching away from coal and towards renewables and low-carbon fuels using the above mechanisms.

Experience of ETS and power sector interaction

Korea

The Korean case study provides insight into how an ETS could work to support power sector decarbonisation in Asia. Whilst the Korean ETS (K-ETS) is not yet effectively driving fuel switching away from coal, there are soon to be implemented improvements that will help this and a clearer understanding has emerged on what will be required overall.

In 2022 an 'Environmental Merit Order' (EMO) system will be introduced that will reflect K-ETS carbon costs in power station dispatch decisions in the wholesale electricity market. This provides a key mechanism for driving the switch away from coal power. Carbon costs will also be passed through to retail electricity prices under a new policy although, at least initially, the level of pass-through will be limited.

Whilst the EMO policy had been under consideration for a few years with little progress towards implementation, willingness to implement it has recently grown in response to slow changes in Korea's power sector energy mix away from coal and the need to reach more ambitious 2030 GHG emission reduction targets. Further political will, however, is needed to allow the full cost pass-through of carbon costs to retail electricity prices.

A stronger carbon price signal as a result of ambitious cap-setting in line with the pathway to net-zero 2050 GHG emissions is likely if the proposed revision to Korea's 2030 GHG emission reduction target of 40% (increased from 26.3%) compared to 2018 is formally adopted. This is because there is a methodology to link the K-ETS cap with this target, and the cap should be revised in line with the target at least by Phase 4 (2026 to 2030).

To further strengthen the carbon price signal, the auctioning share for the power sector would need to increase significantly above the current level of 10%, which can be feasible when full cost pass-through to retail prices is enabled and the EMO is implemented. Modelling results were presented that demonstrated the benefit of full auctioning to the power sector in driving the shift away from coal, even at modest carbon price levels. At higher future prices the impacts will be even more significant.

Currently allocation for Korea's power sector is mainly free, based on coal and gas benchmarks, with benchmark levels designed to gradually disadvantage coal, with a switch to a unified benchmark for coal and gas later in the current Phase 3 under certain conditions. Such a unified

benchmark will be an important element of any remaining free allocation to reflect the carbon costs of coal power.

A side-effect of achieving an efficient interaction between the K-ETS and the power market is that there would no longer be any need for indirect emissions allocation for electricity consumption, which was introduced as temporary measure to partly address this issue. A concern was raised that this will reduce the coverage of the K-ETS as many entities, eg in the building sector, only qualify for inclusion due to their electricity consumption. However, this can be addressed by other approaches to counter-act such a reduction in coverage.

China

China's national ETS is not currently effective in driving the switch in generation from coal to renewables due to government controls on power station dispatch and electricity prices.

The pass-through of carbon costs to wholesale and retail electricity prices in China depends heavily on power market reform. The 3rd power market reform (from 2021) will partly help the ETS and power sector interaction through cancellation of planned electricity pricing for industrial and commercial sectors, coal tariff reforms, and removal of invisible inhibition of upward electricity prices. After further reforms, a more liberalized electricity market will facilitate a more appropriate electricity price, pass-through of carbon costs, favorable competitive conditions for renewables and more efficient cross-subsidies. Modelling results were presented that demonstrated the benefit of increasing levels of cost pass-through on reduced CO_2 emissions.

Top-down pressure and political will for this can come from China's carbon peaking and neutrality goals, as well as concerns about security of power supplies.

A key urgent action will be to build on the spot power market as soon as possible.

Policy mix issues include conflicts between regulation at provincial and national levels, and lack of coordination between the national ETS and other policies including green certificates, the guarantee mechanism for renewable absorption, and a range of other mechanisms governing power dispatch.

The importance of the national ETS in achieving China's carbon neutrality goals was emphasized given that past policies are not sufficient and that ETS will be a global policy tool and an important channel for cooperation with other countries.

Indonesia

Indonesia started its voluntary ETS trial for the coal power sector in 2021 with a mandatory ETS to be introduced from 2025, expanding to additional sectors afterwards. Discussions are taking place on how to help power companies switch to renewables in the context of the ETS. A key issue includes very rigid power purchase agreements. It was noted that there is a merit order power market system which makes the EMO type of policy being implemented in Korea potentially applicable.

Japan

Japan already has a deregulated energy market but has not yet decided on its carbon pricing policy. There is an ambitious proposed 2030 renewable energy target, with a renewables policy similar to a renewables portfolio standard, although this provides no explicit incentives for fuel switching from coal to lower carbon fuels.

Thailand

Thailand's power sector is the country's largest emitting sector but has only a relatively small emission reduction target. Challenges for a potential ETS in the power sector include lack of a

clear carbon price signal, the power market not being liberalized, some merit order concerns, and political challenges with higher electricity prices.

European Union

The EU ETS has been an important contributor to global power sector GHG emission reductions, including the switch away from coal and towards lower carbon fuels and renewables. For example, in 2020 the German power sector reduced its GHG emissions by 40 million tonnes due to coal to gas fuel switching. The impact of the EU ETS in reducing power sector emissions is set to increase under the proposed revisions as part of the EU's 'Fit for 55' package to align GHG emission reductions with the pathway to net-zero. These would require a steeper cut in the EU ETS cap of 61% by 2030 compared with 2005. The prospect of this tighter cap has driven the recent increase of EU carbon prices to above $80/t in late 2021, reaching $100/t in December. Through its impact on power station dispatch, the EU ETS is expected to continue its key role in the sharp decline of the EU's coal power sector after an increase in 2021 due to high natural gas prices.

The experience of a major power company operating in the EU ETS was shared by Uniper, a power generator based in Germany and the 8th largest emitter in the EU ETS. Since 2018, the EU ETS carbon price has massively reduced carbon-intense generation of Uniper's portfolio deprioritizing it within the merit order[1]. Key factors supporting the effectiveness of the EU ETS, according to Uniper, include:

- Highly integrated liberalized power wholesale market: liberalized spot and forward markets ensure that profit-maximization in dispatch and hedging decisions requires full consideration of associated carbon emission costs.
- Stable regulatory and legal framework: the lengthy and complex legislative process in the EU with 'qualified majority' provides a rather stable legal and regulatory environment.
- High market liquidity: liquidity benefited from a surplus due to over-allocation in the 2nd trading period, unlimited banking possibilities and intense speculative activity.

From Uniper's point of view there are a number of positives about the EU ETS including an acceptable administrative burden, effective surveillance, an established compliance process and an effective carbon emission price signal. Some areas for improvement include an unstable price signal for long-term investments, communication of authorities, policy overlap and political interventionism.

<u>Design and initial performance of China's national ETS</u>

The meeting included an interview with Professor Zhang Xiliang of Tsinghua University by Professor Robert Stavins of Harvard University to examine key aspects of the design and initial performance of China's national ETS. Some of key points from the interview included:

- *Why did China implement an ETS instead of a carbon tax?* The NDRC, which was in charge of climate change policy at the time, was more interested in emissions reductions, and wanted certainty about the amount of emissions reductions – with is more directly controlled by an ETS than by a tax. They were less concerned about uncertainty in the carbon price. Also, the management cost of an ETS was regarded as acceptable for the government, with a substantial amount of emissions covered by the top 8,000 enterprises. Furthermore, for a carbon tax, establishing a suitable tax rate is

[1] For example the 2018 merit order included firstly (carbon-intense) lignite, then hard coal, then natural gas. By 2019 the impact of CO_2 prices was to shift lignite towards the back and gas towards the front.

difficult – if it is too low it will not incentivize emission reductions but if it is too high it will be difficult politically.

- *Why was an output-based tradeable performance standard (TPS) system adopted instead of a mass-based cap and trade (C&T) system?* The TPS system has a lower cost for enterprises and was politically more acceptable. A mass-based C&T system would be more economically efficient but would be difficult to gain necessary support for at initial stages. In the future it is expected that the system will transfer to a C&T approach, which will be easier to adopt when the power price is determined by the market. The power market reforms seeking this outcome are accelerating. A further improvement, starting from 2022, will be the introduction of a limited amount of auctioning and a corresponding reduction in free allocation.
- *Why are allowance prices so low? Are you concerned about them?* The initial prices have been acceptable at this initial stage, and are within the price band sought by the government at the time of the trading launch. At the very beginning of the ETS the allocation of allowances is not that stringent so we do not expect higher prices at this stage. Benchmarks will become more stringent, with some auctioning also introduced, which will reduce the level of free allocation. Allowance prices will follow an upward trend in time.
- *What is the prospect of linking China's national ETS with other systems?* The priorities are to improve the system and expand its sectoral coverage. Linking may happen when the system is more optimized. We will need to wait until the conditions are right. In the long-term we do not rule out linking, and China supports global carbon pricing systems.
- *How important will China's national ETS be within the overall climate policy mix?* Over time it will become one of China's most significant climate policies.

Annex 1: Agenda

Session 1		
Introduction		
10 mins	Introductory remarks	Alistair Ritchie, ASPI Wu Libo, Fudan University Robert Stowe, Harvard University
How an ETS can interact with the electricity market to support power-sector decarbonization		
Part 1 China		
20 mins	Presentation: Challenges and solutions for how China's ETS can support the switch away from coal and towards renewables and low carbon fuels, considering reforms of China's power sector	Wu Libo, Fudan University
10 mins	Response	Li Jifeng, Development Research Center of the State Council
30 mins	Discussion: How can carbon costs be passed through to electricity prices and be reflected in power station dispatch? How can electricity markets be developed to be beneficial for ETS? How can adverse impacts of high electricity prices be mitigated?	Moderated by Valerie Karplus, Carnegie Mellon University
Part 2 Other Asian countries		
20 mins	Presentation: Korea's progress, challenges and solutions in passing through carbon costs to electricity prices and reflecting in power station dispatch, as well as other aspects of ETS power sector coverage	Seung Jick Yoo, Sookmyung Women's University, Korea
10 mins	Break	
30 mins	Interventions from other countries: How applicable are the challenges and solutions in China and Korea to other Asian countries? What are the key learning points for the different countries?	Saleh Abdurahman, Ministry of Energy, Indonesia Toshi Arimura, Waseda University, Japan Nopparat Phrom-In, TGO, Thailand
How an ETS can work effectively with other policies targeting power sector GHG reductions		
20 mins	Presentation: Interactions of China's ETS with complementary and competing policies to decarbonize power sector, including solutions for optimal policy mix	Zhang Jingjie, China Electricity Council
25 mins	Discussion: What are key challenges and solutions to achieve an optimal policy mix in for the power sector in China and other Asian countries?	
Conclusions		
5 mins	Concluding remarks and scene setting for Session 2	Alistair Ritchie, ASPI

Session 2		
Welcome back remarks		
10 mins	Summary of Session 1 and introduction to Session 2	Alistair Ritchie, ASPI
How to achieve effective ETS design and operation as it pertains to the power sector		
30 mins	In conversation: takeaways on performance in the first months of China's national ETS for the power sector and areas for future progress in ETS design and operation	Zhang Xiliang, Tsinghua University Interviewed by Robert Stavins, Harvard University
20 mins	Experiences and lessons from power companies covered by China's national ETS	Zhang Jingjie, China Electricity Council
20 mins	Experiences and lessons from power company covered by the EU ETS	Daniel Ziegler, Uniper, Germany
20 mins	Discussion: Challenges and solutions for ETS design and operation as it pertains to the power sector in Asian countries	
Concluding session		
15 mins	Discussion: Next steps and research needs for effective ETS and power sector interaction in Asia, with interventions across jurisdictions	
5 mins	Summary of challenges and solutions for ETS and power sector interaction, design and operation	Alistair Ritchie, ASPI