



China's climate policies with an emphasis on carbon trading markets

KEY FINDINGS

China has emerged as an important actor on the global stage with regards to the United Nations (UN) climate negotiations. China played a vital role in the successful entry-into-force of the Paris Agreement (PA) and has continued to show commitment to its implementation.

The country has adopted a range of climate policies in order to fulfil its Nationally Determined Contribution (NDC) commitments by accelerating efforts to both improve levels of energy efficiency and to encourage a shift away from coal energy to low-carbon alternatives.

In the UN climate negotiations China continues to advocate that developed countries need to enhance their mitigation efforts and provision of financial support for developing countries.

While the carbon and energy intensity targets for 2020, outlined in the 13th Five Year Plan (FYP), appear to be within reach, the recent increase in coal consumption in China has led to concerns regarding the achievement of the 2030 targets. Transforming such a vast economy and its energy system is in any case a long-term task that requires continuous political commitment and a wide range of well functioning policies across different levels and sectors.

If the national Emissions Trading Scheme (ETS) is implemented successfully (learning from the experiences of the regional ETS pilots), a strong CO₂ price signal (along with market reforms to the power sector) should ensure that CO₂ emissions in China peak by 2030.

Introduction

Since President Xi Jinping took power in 2013, China has endorsed a new strategy to present it as a responsible great power that participates in international rule-making, gradually shifting away from the long-standing 'keeping a low profile' (Tao Guang Yang Hui) strategy since the late 1980s. Characterised by multilateralism, openness and inclusiveness, this new strategy aligns with and mutually supports China's decades-long domestic reform drive, which is at a crossroads due to the pressing need to transition to a more sustainable growth model (Li et al. 2017). This is also reflected in the global climate governance regime. In recent years, the world has witnessed a complete repositioning in China's climate negotiation strategies. Not only did China play a role in the successful negotiation and early entry-into-force of the PA, it also continued to show commitment to its implementation, despite the announcement of withdrawal from the Trump administration. Indeed, China's recent launch of its national ETS provides further evidence



of the country's willingness to implement climate policies to deliver on its domestic and international commitments.

Climate policies in China to implement the Paris Agreement

Based on its national circumstances, development stage, sustainable development strategy and international responsibility, China (2016b) has nationally determined its actions by 2030 as follows:

- Achieve the peaking of CO₂ emissions around 2030;
- Lower CO₂ emissions per unit of GDP by 60% to 65% from the 2005 level;
- Increase the share of non-fossil fuels in primary energy consumption to around 20%;
- Increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level.

All these goals are implemented through a policy framework that includes FYPs and various policies and regulations. The 13th FYP has set the following two targets to encourage the decoupling of economic activity in China from the production of CO₂ emissions:

- Reduction in carbon intensity of China's economy to 18% below 2015 levels by 2020;
- Reduction in energy intensity to 15% below 2015 levels by 2020;

The 13th FYP further allocates these targets to individual provinces and caps the total energy consumption in China at five billion metric tons of standard coal equivalent by 2020 (China 2016c).

Energy efficiency has long been a main focus of China's energy and climate policy, in particular on industrial processes i.e. through its Top 1,000 and later Top 10,000 Enterprises Programmes (with mandatory energy conservation targets for industrial companies). China has also introduced minimum energy performance standards for both new and existing residential and commercial buildings and a green building certificate system. For the transport sector, it has implemented emissions and fuel economy standards and promoted the development of electrical mobilities.

China intends to transform the energy mix of the country away from its historical dependence on coal by promoting alternative sources in order to also combat air pollution issues.

China has encouraged the exploration and production of domestic unconventional natural gas and has established natural gas import contracts with major gas producing countries. Indeed, the Chinese government intends to increase the use of natural gas to over 10% of national primary energy consumption by 2020 (China 2016b).¹ However, Yue Qin et al. (2018) argue that domestic unconventional gas production and actual gas imports are still consistently below the government's targets reflecting both geological constraints (i.e. deeper shale resources and insufficient water availability) and market barriers (i.e. natural gas markets are heavily regulated by the government).

The Renewable Energy Law established a set of feed in tariffs (FITs) for different renewable technologies, which has led to a rapid growth in renewable capacity in the country. China (2016a) builds upon this progress, by setting a target for renewables to account for 27% of total electricity production by 2020. A total investment of 2.5 trillion Chinese Yuan (CNY) was announced to further support renewables over the 2016-2020 period (China 2016a), confirming the country's leading global status in terms of investment. The share of renewables in total electricity generation has increased from 16.2% in 2011 to 26.5% in 2017 (Renewable Energy Institute 2018). However, the country still remains reliant upon fossil fuel sources of electricity production. Further progress on renewable deployment will depend partly upon improvements to the electricity distribution system² in order to reduce the curtailment of wind and solar power and the success of on-going reforms to the way in which renewables are financially supported (i.e. transition from FITs to forms of competitive auctioning for renewables).³

Policies to restrict the construction of new coal fired power plants⁴ and to enforce national standards on the efficiency of coal fired boilers,⁵ have contributed to a decline in the share of coal in total primary energy consumption to 60.4% in 2017, which is the lowest on record (BP 2018a). However, after three years of successive declines, the consumption of coal in China has increased by 0.5% in 2017 (BP 2018b) and, more worryingly, by 3% during the first six months of 2018 resulting in an emissions increase that is 'globally significant' (Unearthed 2018). The 2017/18 increase in coal consumption reflects the surging energy demand resulting from recent industrial growth and a relaxation of regulations that restricted coal capacity (Unearthed 2018).⁶

Despite the recent increase in CO₂ emissions, the top climate official, Xie Zhenhua still announced that China has already achieved its 2020 carbon intensity target three years earlier. The role of the regional ETS pilots in China was especially acknowledged in their contribution to the achievement of the carbon intensity target (UN Climate Change News 2018). It is likely that the more stringent 2020 energy intensity target to limit fossil fuels will also be met. However, the Climate Action Tracker (2018) argues that neither of these targets are compatible with limiting global temperature rise to 1.5°C or even 2°C. Given the recent increase in coal consumption, it is still uncertain whether CO₂ emissions will peak before 2030. However, the launch of the national ETS in December 2017 should act as a catalysis for further decarbonisation in the economy, starting with the power sector.

Recent institutional reform in China is likely to impact upon the future implementation of climate policies. On 17 March 2018, the 13th National People's Congress approved the plan to restructure the State Council, including the establishment of a new Ministry of Ecology and Environment (MEE) to replace the Ministry of Environmental Protection (MEP). In addition to environmental governance, the new ministry also takes over the climate change responsibilities previously held under the National Development and Reform Commission (NDRC) and takes charge of the development of the national ETS. Together with the newly established Ministry of Natural Resources (MNR), MEE has become one of the two mega ministries in charge of environmental protection and resource management. Implications of the institutional reform on climate change and the national ETS include:

- **Integration of climate change into environmental governance:** Until recently, the Chinese government has tended to see climate change as a development and international diplomacy issue. The prospect to endorse a legal definition of greenhouse gases (GHG) as a pollutant i.e. via an amendment to the existing environmental law or by creation of a new stand-alone climate change law in China,⁷ could make climate change a direct target of its increasingly assertive, legally and politically backed environmental protection efforts.
- **Potentially stronger monitoring, reporting and verification (MRV), supervision and enforcement mechanisms:** Facing severe environmental challenges, China is making a broader effort to advance a comprehensive and robust environmental regulatory system. According to the new MEE minister Li Ganjie, 'basic positioning of the MEE is supervision (Jian Guan), focusing on eco-environment system formulation, monitoring and evaluation, supervision of enforcement, and inspection and accountability' (People's Daily Online 2018). This implies that all environmental management functions under the MEE are expected to be subject to higher standards, stricter rules on MRV, supervision and enforcement.
- **Cross-department coordination of climate change related responsibilities:** Unlike the previous Climate Change Department under the NDRC, the new one has a less comprehensive climate mandate where other departments also share part of the climate related tasks. This means more cross-department coordination is required.
- **Uncertainties for the national ETS:** The institutional reform requires adjustments both at the central and local (i.e. provincial) levels. Although provinces are requested to submit their respective institutional adjustment plan by the end of September, it is expected to take

longer to finally confirm them by the end of the year. This may result in some delay of the local governments' actions in preparation for the national ETS.

- **Capacity building:** The environmental ministry and respective bodies at local levels have been focused on command-and-control measures and are unfamiliar with market based policies. Hence institutional capacity building is necessary.
- **Potential broader concern:** There is concern that removing climate policy from the NDRC's mandate might weaken activity, as the NDRC remains a powerful super-ministerial policy planning body, and climate mitigation requires rethinking of development pathways and economic fundamentals.

China's position in view of the Conference of Parties (COP) 24

The recent institutional changes within China have not led to a substantial change with regards to the country's international climate negotiation stance or mandate.

While the PA of 2015 represented a landmark moment in the climate negotiations in terms of vision (i.e. limiting global temperature rises to 1.5 to 2°C above pre-industrial levels) much of the detail on the implementation was postponed to subsequent talks. COP 24 therefore represents a critical phase as countries are required to deliver concrete progress on the 'rulebook', which will provide operational guidance i.e. the provision of common metrics for commitments, standardised accounting rules and a review mechanism for scaling up actions.

China's position with regards to the rulebook is that 'the features of the NDCs should reflect differentiated responsibilities of developed and developing country Parties, in line with Article 3, 4.4, 4.5, 9, 10 and 11 of the Paris Agreement' (China 2017). However, it became very apparent during the recent talks in Bangkok in September 2018 that both the EU and the U.S. (and its allies) were opposed to such an idea of a 'two-tier' rulebook (Climate Brief 2018).

A facilitative dialogue has also taken place amongst Parties in 2018 to take stock of the collective efforts of Parties, which was subsequently renamed the 'Talanoa Dialogue'. It aims to address three questions about climate action (1) Where are we? (2) Where do we want to go? (3) How do we get there? China expressed in its submission to the Dialogue that collective efforts to address climate change are 'significantly inadequate', that climate targets should be 'aligned with other 2030 Sustainable Development Goals' and that 'adequate financial, technological and capacity building resources need to be provided to developing countries' (China 2018).

Piloting carbon trading in seven Chinese regions

Given the challenge of delivering the carbon and energy intensity targets outlined in the FYPs, the Chinese government has, over time, shifted from a command and control approach towards more market-oriented measures. Building on its positive experience with the Clean Development Mechanism (CDM) and motivated by the advantages associated with emissions trading (i.e. cost-effective climate mitigation, co-benefits such as air pollution control and supporting western provinces' ecological efforts via the use of offsets in which eastern richer provinces pay); China announced in October 2011 the approval of seven regional ETS pilots. These include all four province-level municipalities (Beijing, Shanghai, Tianjin and Chongqing), two provinces (Guangdong and Hubei) and one special economic zone, which is also the only sub-province level pilot (Shenzhen).⁸

Key design elements of the Chinese regional ETS pilots

An overview of the key design features of the regional ETS pilots is provided in Table 1. The table highlights the key commonalities (shaded in light green). Together, the regional ETS pilots cover 1.2 billion tons of CO₂e per year, about 11.4% of national emissions in 2014 (Zhang et al. 2017).

Table 1 Comparison of the key design features of the regional ETS pilots

	Beijing	Chongqing	Guangdong	Hubei	Shanghai	Shenzhen	Tianjin
GHG target							
Total cap (Mt CO ₂ e)	46 (2016)	100.4 (2016)	422 (2017)	257 (2017)	156 (2017)	31.45 (2015)	160-170(2013)
Scope							
Sectoral coverage							
Electricity	✓	✓	✓	✓	✓	✓	✓
Water supply					✓	✓	
Manufacturing	✓	✓	✓	✓	✓	✓	✓
Services	✓				✓		
Aviation			✓		✓		
Other Transportation	✓				✓	✓	
Direct and indirect emissions	✓	✓	✓	✓	✓	✓	✓
GHG Coverage							
CO ₂ only	✓		✓	✓	✓	✓	✓
CO ₂ , CH ₄ , N ₂ O, HFC, PFC, SF ₆		✓					
Thresholds							
t CO ₂ e / year	5,000	20,000	20,000		20,000*	3,000	20,000
metric tonnes of coal equivalent			10,000	10,000	10,000**		
Share of total emissions	~ 45%	~ 40%	~ 60%	~ 35%	~ 57%	~ 40%	~55%
Number of entities	582 (2016)	237 (2016)	296 (2017)	344 (2017)	298 (2017)	824 (2016)	109 (2017)
Allocation							
Free allocation	✓	✓	✓	✓	✓	✓	✓
Grandfathering	✓	✓	✓	✓	✓	✓	✓
Benchmarking	✓		✓	✓	✓	✓	✓
Auctioning			✓	✓	✓	✓	
Flexibility							
Banking	✓	✓	✓	✓	✓	✓	✓
Borrowing							
Offset (CCER) limit as a share of annual allocation	✓	✓	✓	✓	✓	✓	✓
annual compliance obligation	5%	8%	10%	10%	1%	10%	10%
Provisions for price management	✓	✓	✓	✓	✓	✓	✓
MRV							
Annual reporting	✓	✓	✓	✓	✓	✓	✓
Third party verification	✓	✓	✓	✓	✓	✓	✓
Compliance							
Financial penalties	✓	✓	✓	✓	✓	✓	✓
Disqualified from financial support		✓		✓	✓	✓	✓

Note: The thresholds in t CO₂e / year and metric tonnes of coal equivalent only refer to the new entrants in power and industrial sectors since 2015; and the rest with 50% of the thresholds. They are not holding regular auctionings of a certain share of allowances, as part of the allocation process.

Source: ICAP (2018b), Pang and Duan (2015), Zhang et al. (2017), Zhang (2015), Zhang et al. (2014).

The key design elements undertaken in the regional ETS pilots are summarised below:

- **Cap setting approaches:** The regional ETS pilots mainly rely upon a bottom up approach to cap-setting, which is determined by aggregating the emissions reduction potential for the covered sectors, sub-sectors or participants (Pang and Duan 2015). 'The caps of the pilot programmes are characterised by flexibility or adjustment, namely flexible caps. Among the seven pilot programmes, some have pre-determined caps, while others do not' (Pang and Duan 2015).
- **Allowance allocation:** There are three major ways to distribute allowances in an ETS; free allowances via grandfathering⁹ or benchmarking¹⁰ as well as auctioning. Despite choosing different approaches and formulae for allocation, the regional ETS pilots have been giving out almost all allowances for free, with the exception that Guangdong auctions a small share of allowances.¹¹ There has been ad-hoc auctioning conducted by Shanghai, Hubei and Shenzhen mainly for the purpose of offering compliance entities with more allowances and/or enhancing market liquidity and facilitating price discovery. Most regional ETS pilots use both free allocation methods apart from Chongqing where only grandfathering is used.¹² For the existing entities, grandfathering is the most common allocation method, while benchmarking is an approach being either gradually introduced or expanded upon in several of the regional ETS pilots. Benchmarking typically applies to electricity, heat, aviation, and certain industry sectors like cement, paper and steel.

The regional ETS pilots often adopt ex-post adjustments based on current production levels or current emission levels for a varying number of enterprises in different sectors (Pang and Duan 2015). Given that the overall economy or sector, as well as output of enterprises in China can fluctuate highly, the use of ex-post adjustments to allocation is deemed necessary in order to set more flexible caps. Regarding new entities, different approaches have been taken. With the exception of Chongqing, all of the regional ETS pilots have provided free allowances for new installations (built by existing enterprises), adopting either production-based benchmarking (i.e. sector wide intensity standards) in Beijing, Tianjin, Shenzhen and Guangdong or emission-based allocation (i.e. relates to changes in emissions relative to initial allocations) in Shanghai and Hubei (Pang and Duan 2015). Beijing, Guangdong, and Shenzhen have all adopted the same free allocation methods for new enterprises as for new installations (built by existing enterprises), while Shanghai, Chongqing, and Hubei do not include new enterprises (Pang and Duan 2015).

- **GHG covered:** All of the pilot schemes, except Chongqing, cover only CO₂ emissions, primarily to simplify MRV requirements.
- **Sectors covered:** The selections of sectors covered mainly reflects the different economic and industrial structures of the regional ETS pilots. The common sectors across all regional ETS pilots are electricity and manufacturing and other energy intensive industries in their jurisdictions. The aviation sector is covered in the Shanghai and Guangdong regional ETS pilots. Shanghai also covers less common sectors like shipping and railways and Shenzhen covers ports, subways and public buses.
- **Thresholds:** The emission threshold for the eligibility of energy and industrial enterprises ranges across the regional ETS pilots from 3 000 tCO₂e per year in Shenzhen to 20 000 tCO₂e per year in Chongqing, Guangdong, Shanghai and Tianjin. In Hubei,¹³ Guangdong and Shanghai a threshold of 10 000 metric tonnes of coal equivalent (tce) can also be applied.
- **The compliance body:** All of the regional ETS pilots have enterprises rather than installations as the legally responsible entities for ETS compliance (Zhang 2015).
- **Point of regulation:** They all include direct and indirect emissions. Given that China's electricity price is regulated, the ETS price signal cannot be passed to electricity users.

Therefore covering indirect emissions helps to ensure that industrial users have an incentive to reduce their electricity consumption (Zhang et al. 2014).

- **Share of total emissions and number of entities:** The combined effect of these variables influences the share of covered emissions in total emissions in each regional ETS pilot (from around 35% to 60% coverage). They also influence the number of entities covered (from over 100 entities in Tianjin to more than 800 in Shenzhen).
- **Flexibility:** To lower the cost of compliance, all of the regional ETS pilots in China allow banking between compliance periods in the pilot phase¹⁴ while all forbid borrowing fearing the negative effect on market liquidity and price discovery (Pang and Duan 2015). Domestic offsets are allowed in all regional ETS pilots for the covered entities to use to partially meet their abatement, with a limit of up to 10% of allowances or verified emissions. All accept credits from the national level CDM-style offset program, the Chinese Certified Emission Reductions (CCERs), while some also have their own program in addition to CCERs such as Guangdong and its Pu Hui Certified Emission Reduction (PHCER) credits. Quantitative restriction on CCERs also applies, which are set based on the type of project, the date of origin, or the location.
- **MRV:** Each regional ETS pilot has established an MRV system with an annual reporting cycle and verification from third parties. Local MRV guidelines are set at the sectoral or institutional level, which have been improved during the piloting years. While accounting methodologies are similar, differences exist among the ETS regional pilots regarding technical aspects such as use of default factors (Zhang 2015). Verification cost is covered by the local government in most of the regional ETS pilots, who also themselves select and assign the verifiers (Zhang et al. 2017), except Beijing and Shenzhen. In some regional ETS pilots, e.g. Shanghai and Guangdong, the verification report will be double-checked by a fourth party to further ensure its quality.
- **Legal basis and compliance:** Interim Measures for the Administration of Carbon Emission Trading, a regulation published by NDRC in 2014, is an overarching legal basis for the regional ETS pilots. Only Shenzhen and Beijing managed to pass the local ETS legislation in their regional congresses. The majority of the regional ETS pilots are regulated by government orders in the respective jurisdictions. They have all built in a compliance system, with a variety of different sanctions ranging from naming and shaming and the threat of financial penalties to future ineligibility for government support. All the regional ETS pilots except Tianjin have adopted financial penalties where the charges are either linked with the carbon price (e.g. 3-5 times) or a pre-determined level.
- **Market/price management:** In addition to necessary rules on registration, information disclosure and treatment of disputes, all the regional ETS pilots set the price limit based on the previous session's closing price or the settlement price, ranging from 10% to 30% (Dong, et al. 2016). Guangdong and Hubei set up government allowance reserves, which also serve as a means to manage market fluctuations. Beijing has taken a quite unique approach by setting a price floor and ceiling (i.e. CNY 20 and CNY 150 respectively).¹⁵ Chongqing has general provisions allowing the government to use price stabilisation measures.¹⁶ Being the only regional ETS pilot to adopt auctioning as an allocation method, Guangdong has an auction floor price as a way of price management.¹⁷

Performance and key lessons

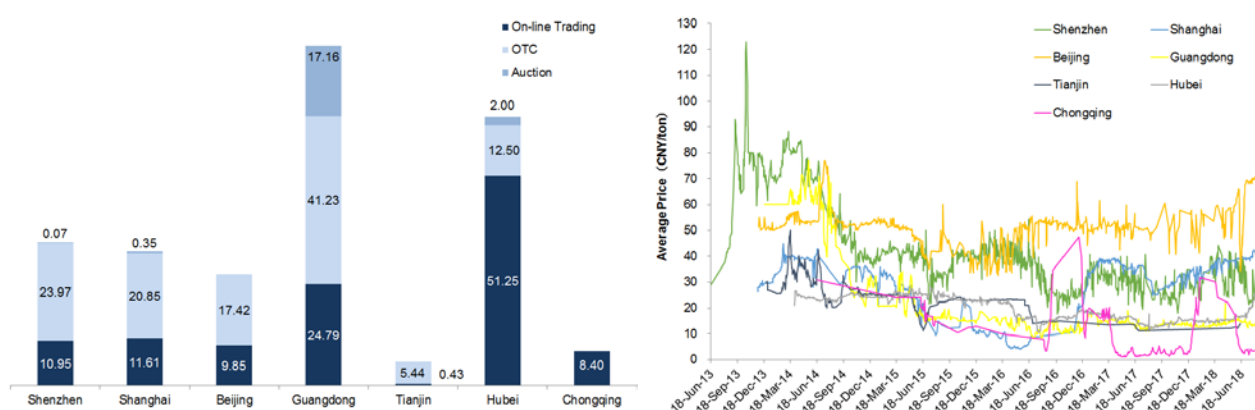
Yi et al. (2018) assessed the maturity of the regional ETS pilots in China based upon an evaluation index system, which took into account criteria such as environmental attributes, market and finance, supporting policies and infrastructure and the service capability of the trading platform.

Shenzhen (0.8113) was deemed to be the most mature regional ETS pilot, due to its market oriented mechanism. Several of the regional ETS pilots have similar degrees of maturity but with different characteristics. Beijing (0.5735) has the most diversified emission controlled entities and strong environmental constraints, Hubei (0.5432) is primarily driven by institutional arrangement, Shanghai (0.5004) has an outstanding platform service and Guangdong (0.4846) promotes the development of its primary market. While Tianjin (0.2616) and Chongqing (0.1338) exhibit lower level of maturity.

Overall the regional ETS pilots are still in their infancy and have generated moderate emissions trading activities with limited impacts on mitigation and cost saving (Zhang et al. 2017). However, the primary goal of the regional ETS pilots is to experiment with the ETS policy instrument for China and in this context they are successful in reinforcing China’s capacity and confidence in the use of market based measures. Key performance indicators include:

- **Compliance rate:** Despite difficulties in some of the regional ETS pilots, such as for Chongqing in early years, in general they enjoy a very high compliance rate i.e. above 99% in most cases. Shanghai is quite outstanding still, being the only one to achieve a 100% compliance rate for three years in a row (Zhang et al. 2017).
- **Trading volume and cumulative value:** As of 31 August 2018, 238.67 million tonnes of emissions allowances have been traded on the secondary market across the regional ETS pilots. This accounts for a total value of 4908.22 million CNY (SinoCarbon¹⁸). Guangdong has the largest market share followed by Hubei. In Shenzhen, Shanghai, Beijing, Guangdong and Tianjin, over-the-counter (OTC) trade accounts for majority of the trading volume. In contrast, online trading represents the majority of the trading volume in Hubei and Chongqing (Figure 1).
- **Allowances price:** The carbon prices of most markets rose during the early stage of trading and then declined gradually. Most transactions occur in the period that leads up to the compliance deadline. All allowances are transacted in spot markets and carbon futures have not yet been introduced. Overall the market is rather thin and volatile across the regional ETS pilots (Figure 1).

Figure 1 Cumulative trading volume in Mt between June 18, 2013 to August 31, 2018 (left) and Daily Average Price of Online Trading in CNY/ton (right)



Source: SinoCarbon.

Common difficulties related to emissions trading were identified in the regional ETS pilots:

- **Lack of liquidity:** Key issue undermining performance, which has started to be addressed by most of the regulators dropping their ‘only spot permits, only compliance firms’ approach

and are now more open to the participation of individuals, institutional investors and foreign companies.

- **Over-allocation:** The economic slowdown in China, in combination with a high free allocation rate based on grandfathering, has led to a surplus of allowances accumulating in the regional ETS pilots. As a consequence, limits have been set on the use of domestic offsets in all of them. Ex-post adjustments may enable most of the regional ETS pilots to reduce the surplus; however this information is not normally publicly available.
- **Lack of transparency:** The lack of transparent government data on the fundamentals of the market has hindered the efforts of price discovery. Price surges were experienced at the beginning of the ETS pilots (e.g. the allowance price in Shenzhen increased from 30 CNY/tonne in June 2013 to 100 CNY/tonne in October 2013) driven primarily by market information uncertainty. Price spikes were also observed around compliance periods in Shanghai (June 2014), Beijing (July 2014) and Hubei (July 2015), reflecting the fact that the regional ETS pilots are primarily spot markets with minimal low-cost hedging tools (Environomist 2016).

The development of a national ETS in 2018-2020

The launch of China's national ETS in 2017 has been a goal set in 2015 at China's highest political level, which was reaffirmed by its NDC, and the '13th Five-Year Work Plan for Greenhouse Gas Emission Control'. Through a video conference call on 19 December 2017, including both national ministries and provincial governments, China launched its much-anticipated national ETS. The provisions for the launch and incremental development of the ETS are laid out in the Work Plan for Construction of the National Emissions Trading System (Power Sector), (hereinafter referred to as the 'Work Plan'), which was approved by the State Council late in 2017. Other key documents throughout the preparation phase are 'Interim Administrative Measures on Emissions Trading' (December 2014), the 24 'Guidelines for GHG Monitoring and Reporting' for various sectors (2013, 2014, 2015), and the 'Notice on Key Works in Preparation for the Launch of the National ETS' ('NDRC 2016 No. 57', January 2016).

Key features of the national ETS are as follows, based on the Work Plan, public resources available (ICAP 2018a) as well as insights from domestic Chinese ETS experts:

- **Top-down approach with some flexibility for local government:** In the lead up to the launch, there were two approaches discussed regarding how to move from the piloting phase to the national ETS phase, namely top-down and bottom-up. In the end a political decision was made by NDRC to use a top-down approach in which unified rules set by the central government will apply to all participants in the national ETS. Some flexibility is expected to be given to local governments (i.e. option to include more sectors or to have stricter free allocation rules).
- **Roadmap:** A three-phase roadmap has been adopted (Article 3, Work Plan). Phase one has to do with the development of market infrastructures (roughly one year); phase two foresees simulation trading (roughly another year); and phase three will be the deepening and expansion phase, with allowance spot trading for compliance purposes (roughly starting from 2020).
- **Rules and market infrastructure:** Supplementary technical rules on MRV, allowance management, and market trading will be further developed (Article 10-12, Work Plan). So too will the market infrastructure and supporting systems (Article 15-18, Work Plan) e.g. the national registry (led by Hubei) and the trading platform (led by Shanghai). Additionally, an ETS administrative regulation (the Interim Regulation on Carbon Emissions Trading) needs to be passed by the State Council.

- **Two-tier governance structure:** The national government sets the rules while the local government will implement these rules in their region.
- **Gradual evolution, improvement and expansion:** Given the complexity of designing and overseeing the world's largest carbon market with vast regional and sectoral differences, the approach is to gradually develop the market following a learning-by-doing approach. The market will also gradually expand to cover additional sectors (Article 7, Work Plan).¹⁹
- **Key uncertainties:** There are significant uncertainties surrounding the national ETS regarding when the first compliance period for the power sector will start, as well as when there will be a specific timeline for introducing the other sectors, what the exact role of CCERs will be and which kinds of limitations will apply, and when it will open to non-compliance entities such as investors.
- **Integration of regional ETS pilots:** Most of the pilots are still continuing to operate while the national ETS is under development and will hopefully be fully operational by 2020.²⁰ As the expected coverage of the national ETS varies quite a lot with some regional ETS pilots, there could be two different models as to how regional markets relate to the national one: they may either continue to run local markets with those entities not covered by the national ETS kept separate from the rules or platforms of the latter; or they may just include or opt in these entities into the national market.
- **Interactions between market reform and ETS in power sector:** China's ETS, like most carbon markets, will include electricity generation. Though an underlying difference is that where most of other power sectors under ETS regulation operate within competitive markets and by extension cost-based pricing, China's system is still subject to a highly regulated dispatch and pricing system. The benefits of an ETS in a controlled market are inherently reduced. There are plans in motion to deregulate the power sector, with some initial reform happening ten years ago, though lately this push has been slowing down. The Government has new plans to revamp the deregulations in the coming two years (2018-2020) (Teng et al. 2017). Reform in China's power sector is of utmost importance for its wider climate goals as power generation is far and away the largest share of its GHG emissions. In order for China to reach its goal of having CO₂ emissions peak by 2030, then the share of non-fossil fuel generated energy in the power sector has to be more than 40%. Teng et al. (2017) have further calculated that the most effective way to reduce CO₂ emissions in China's power sector would be to introduce market reform coupled with a moderate carbon price. The two on their own would still have an impact but would fall short of the 40% non-fossil-fuel goals, and subsequently the peak emissions goal.

Conclusions

In recent years, China has emerged as an important actor on the global stage with regards to the UN climate negotiations. China played a vital role in the successful entry-into-force of the PA and continued to show commitment to its implementation, despite the announcement of withdrawal from the Trump administration. The country has adopted a range of climate policies in order to fulfil its NDC commitments by accelerating efforts to both improve levels of energy efficiency and to encourage a shift away from coal energy to low-carbon alternatives. Ahead of COP 24, China continues to strongly advocate a distinction remains between the obligations of developed and developing countries. Furthermore, while the carbon and energy intensity targets for 2020 appear to be within reach, the recent increase in coal consumption in China has led to concerns regarding the achievement of the 2030 targets. Transforming such a vast economy and its energy system is in any case a long-term task. If the national ETS is implemented successfully, a strong CO₂ price signal (along with market reforms to the power sector) should ensure that CO₂ emissions in the country peak by 2030.

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- ¹ As of 2016, natural gas accounted for around 6% of total primary energy consumption (BP 2018a).
- ² China has requested that local governments 'ease the burden' on renewable power generators by strengthening guaranteed purchase agreements and giving them priority access to new grid capacity (Reuters 2018).
- ³ The National Energy Administration outlined a new set of rules for an auctioning system in 2018 whereby all large-scale wind farms (both onshore and offshore), will go through competitive bidding based on the cost of construction and power prices. 'The government will then set a tariff for the project which cannot be exceeded' (Kabeer 2018). In addition, 'the country's National Energy Administration, the National Development and Reform Commission and the Ministry of Finance released new guidance that terminates any approvals for new subsidised utility-scale PV power stations in 2018'. (Merchant 2018).
- ⁴ In January 2017, the National Energy Administration suspended 101 coal power projects due to concerns of over-supply (Koleski 2017).
- ⁵ 'Increasingly strict controls on total coal capacity and power plant emissions are expected to prompt the retirement of up to 20 GW of older plants and spur technological upgrades to China's remaining 1,000 GW of coal power' (EIA 2018) .
- ⁶ An analysis of 'satellite imagery by CoalSwarm identified 46.7GW of previously suspended coal plants that have started or re-entered construction in the last few months' (Unearthed 2018).
- ⁷ In 2010 the Chinese government announced the start of work on climate change legislation. The first formal draft of the law was completed in the second half of 2014 followed by a formal consultation process with government ministries, industries and other stakeholders. But to date, it has not yet made it onto the State Council's legislative agenda.
- ⁸ In addition, there is another self-developed regional carbon market in Fujian Province, the mandate of which came from the National Ecological Civilization Pilot Area (Fujian) Implementation Plan endorsed by the State Council in August 2016. Given this different mandate as well as relatively short time of operation, Fujian is not included in this briefing paper.
- ⁹ Grandfathering is based on historical emissions or intensities of a base year or base period.
- ¹⁰ Benchmarking is based on performance indicators hence it rewards more efficient entities.
- ¹¹ It was mandatory for enterprises to purchase 3% in 2013 of their allowances from auctions before receiving the remainder for free. Since 2015 this rate has been raised to 5% for power sector and 3% for the remaining sectors.
- ¹² Also different from other pilots, the covered companies are asked to submit their allocation quotas on a yearly basis of which free allocation is based on, if the sum of allocation for all enterprises exceeds the cap, a reduction factor is applied.
- ¹³ The threshold in Hubei during the earlier years was 60,000 tons coal equivalent and in January 2018, Hubei DRC announced the allocation plan for 2017 vintage in which it expands the coverage, from 236 (2016) to 344 entities, by reducing the threshold to 10,000 tons coal equivalent (tce), thus equating the threshold across all covered sectors.
- ¹⁴ Hubei requires surplus allowances which are not used for trading in the current compliance period to be cancelled.
- ¹⁵ The Beijing DRC can auction extra allowances if the weighted average price exceeds the ceiling for ten consecutive days, and buy back allowances from the market if it is below the floor price.
- ¹⁶ Hubei also requests the compliance entities to not sell more than 50% of their free allocations.
- ¹⁷ Initially in 2013, it was set at 60 CNY and then it was lowered to 25 CNY and increased to 40 CNY in steps of 5 CNY with each quarterly auction. In the third year, the floor price is set at 80% of the weighted average price for allowances over the previous three months. In 2016, there was no restriction on the declared price, but a so-called policy reserve price was set, as an effective price floor.
- ¹⁸ The information on the trading volume, cumulative value and price of each of the regional ETS pilots has been provided by SinoCarbon which is not publically available. The authors thank SinoCarbon for this input in particular.
- ¹⁹ This approach is also reflected by a notice by NDRC in December 2017 requiring all local DRCs to begin historical data collection for 2016 and 2017 emissions from eight sectors of the economy (including heat and power, petrochemical, chemical, building materials, steel, nonferrous metals, paper and aviation). These sectors had previously submitted their historical data for 2013-2015 emissions.
- ²⁰ Some pilots might not be that determined to continue running in the lead up to 2020, this include Tianjin and perhaps others. It is important for all pilots how to treat the allowances given to the entities under their systems in the newly established national ETS.

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