

Learning by Doing: A Comparative Analysis of EU and Chinese Emission Trading Systems

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Over the course of 2013 and 2014, seven pilot emission trading systems (ETSs) were launched in various cities and regions in China. This represents a huge potential testing ground for market-based solutions to pollution, both in China and internationally. In aggregate, the pilot markets represent the second largest cap and trade program in the world by emissions—second only to the EU ETS, which has been in place since 2005. Lax enforcement, limited technical expertise, and gaps in the legal and institutional framework could, however, undermine the project. By comparing the evolution of the ETS, relevant laws and policies, as well as institutional capacity for China's ETS and the EU ETS, the paper identifies challenges and opportunities facing policymakers. In particular, the lack of central planning could have potentially damaging effects in the long-term even as it facilitates experimentation in the initial phase. Further collaboration between the EU and China on climate change and specifically ETS could improve the long-term prospects of both systems.

AS GOVERNMENTS COME UNDER INCREASING pressure to address environmental issues without undermining economic growth, they are turning to policy tools such as emission trading systems (ETSs), which are seen as more efficient than pure regulation and more business-friendly than taxation. The development of

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emission trading over the past few decades has been largely shaped by the interaction between academia, policy-making, and environmental activism. In many ways, its intellectual foundations lie in Ronald Coase's writings on property rights, developed in reaction to theories proposing to eliminate negative externalities from economic production through taxation.² According to Coase's argument, the most efficient allocation of resources and level of output—including social costs such as pollution—can be obtained by clearly establishing property rights and a functioning market. Some economists throughout the 1960s and 70s, including John Dales, applied Coase's insights to the environmental field, which eventually led to a more formal conception of an ETS.³ In very simple terms, an ETS requires a functioning market where polluting companies can trade the pollution licenses they were originally allotted according to their need. The US became an early testing ground for cap and trade, which was used to minimize sulfur dioxide emissions and lead fuels starting in the 1980s. At around the same time, several European countries began to implement tax-based solutions to emissions.

Unlike a tax, an ETS ensures optimal allocation of pollution allowances and a market-driven price for emissions; its effectiveness, however, depends on the total number of licenses available on the market and the market conditions, something that has created significant challenges in practice. The tensions between tax-based, purely regulatory, and market-based policies in controlling carbon emissions continue to exist and inform the debate on climate change action. While most national policies involve a mix of different approaches, cap and trade has gained increasing popularity internationally since the Kyoto Protocol (1998), which among other things led to the establishment of the European Union ETS (EU ETS) in 2005. In fact, while emission markets may have originated in the United States, the EU became one of the strongest backers for carbon trading as it moved away from carbon taxes, which were found politically inexpedient. The EU ETS now represents the largest greenhouse gas (GHG) market in the world, providing, for better or worse, a

² Coase largely reacted to the work of British economist A.C. Pigou and those who followed his views on taxation (Pigouvian tax).

³ Tom Tietenberg, "Cap-and-Trade: The Evolution of an Economic Idea," *Agricultural and Resource Economics Review* 39, no. 3 (October 2010): 359–60.

model for other countries. If China were to succeed in establishing a nation-wide ETS, the two markets would be the largest in the world.

The Significance of China's ETS Program

China's unprecedented economic growth since the late 1970s has led to extraordinary social and environmental imbalances, which the government has become increasingly concerned with. Air quality is especially problematic from a political point of view due to its immediate impact on urban dwellers' living standards, placing intense pressure on the state to find solutions. China first experimented with pilot ETS programs on a limited scale in the 1990s. This was the first step towards introducing a market system to monitor environmental degradation and had no noticeable impact in the short term. It would take two decades for the country to move towards implementing a true carbon market. In 2011, the Chinese leadership announced in its twelfth five-year plan (2011-2015) the launch of seven pilot markets in an effort to set the foundations of a nation-wide scheme. Between late 2013 and early 2014, six of the seven Chinese ETS pilots opened to trading.

China's high profile shift toward using market-driven instruments to reduce environmental degradation and pollution has significant implications domestically and internationally. At home, the recently established pilot carbon markets could serve as a model for a national ETS and help alleviate China's air pollution and limit emissions. It could also drive institutional reforms in other sectors, such as law and finance. From an international perspective, if successful, the Chinese carbon dioxide (CO₂) markets would incentivize other countries, like the United States, to accelerate the development of national or regional ETSs. China could also offer a model for other emerging economies struggling to contain high levels of carbon emissions and inject new life in those existing systems whose future depends on the prospective of an integrated global market, like the European Union's. Lastly, the carbon markets could play a significant role in Chinese diplomatic negotiations at the upcoming twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC),

scheduled for 2015 in Paris.

Conversely, if the pilots are deemed a failure, the future of carbon markets will be at risk. Many factors, ranging from corruption to low institutional capacity and bad enforcement, could prevent the scheme from successfully reducing emissions. Insufficient liberalization in the energy markets, finance, and law could also hinder the adoption of carbon markets. Additionally, Beijing's strategy of encouraging experimentation at the local level to develop skills, build political support, and find best practices could have negative repercussions insofar as it will lead to the establishment of isolated markets with distinct rules.

Given the magnitude of the challenge, looking at experiences abroad could help Chinese policymakers avoid pitfalls and adopt best practices in developing emission markets. The EU's cap and trade program traded 7.903 millions of tones in 2012.⁴ Analyzing the EU ETS and comparing it to the Chinese ETS pilots can provide a framework to identify challenges and define expectations for the future of emission markets globally.

While the EU ETS encompasses thirty-one countries, its aggregate volume of emissions is lower than China's, which in 2008 accounted for 23 percent of carbon emissions worldwide (by comparison that same year the EU27 countries excluding Estonia, Lithuania and Latvia accounted for 13 percent).⁵ In 2008, Shanghai's emissions alone were estimated to be higher than those of Italy, the second largest manufacturing country in Europe. By the same estimate, the most industrialized economy in the EU ETS, Germany, was a smaller polluter than the city of Guangdong.⁶ The pilots are operating in geographic areas that account for approximately 42 percent of China's carbon emissions in 2008, which make them aggregately the second-largest ETS in the world after the EU ETS.⁷

⁴ European Commission, *The EU Emissions Trading System (EU ETS) Factsheet* (Publications Office of the European Union, October 2013), 6. http://ec.europa.eu/clima/publications/docs/factsheet_ets_en.pdf.

⁵ United States Environmental Protection Agency, *Global Greenhouse Gas Emission Data*, last updated September 9, 2013, <http://www.epa.gov/climatechange/ghgemissions/global.html>.

⁶ Kong Bo and Carla Freeman, "Making Sense of Carbon Market Development in China," *Carbon & Climate Law Review* 7, no. 3 (September 2013): 195.

⁷ *Ibid.*

The latter regulates about 45 percent of EU GHG emissions and aims to cover 65 percent of emissions by 2020.⁸ Whatever the long-term achievements of the Chinese and EU ETSs, they represent some of the most ambitious experiments in reducing carbon and GHG emissions.

I will first analyze the history and current status of the EU ETS and then provide an overview of the seven Chinese carbon market pilots, followed by a comparative analysis. The comparison will focus on the institutional dimension and the challenges that the Chinese pilots face due to low coordination and bureaucratic capacity. Finally, I will provide suggestions for cooperation.

The European Union Emissions Trading System

The EU is a supranational institution and regulatory giant that was slowly built through an intricate web of laws and agreements between sovereign nations. This means that while implementation is generally left to the individual country, there is a common framework negotiated at the top. The Commission, the top executive agency led by national appointees, acts as a harmonizer by issuing directives that guide domestic policies in the member states. As a consequence, the EU countries' laws and policies are converging overall, particularly in those areas under the Commission's jurisdiction. Governments, however, still have strong incentives to favor their domestic businesses when it comes to handing out permits and issuing fines, especially where they feel that other states are doing the same. Each country has to pass proposed EU regulation through its national political system, adapting it to its specific bureaucratic structure, which leads to differences in implementation. In the case of common targets, the tools through which these are achieved are left to the individual states, meaning that very different policies may be adopted toward the same ends. These competing forces and multiple layers of bargaining are essential to understanding EU governance and the development of the EU GHG emission market.

The EU ETS covers over 11,000 power stations and industrial plants across Europe as well as airlines flying within the

⁸ European Commission, The EU Emissions Trading System (EU ETS) Factsheet, 1.

European Economic Area (EEA).⁹ The system was developed as a policy tool to facilitate compliance with the Kyoto Protocol commitments undertaken by the original EU member states (EU-15). In aggregate, the EU-15 countries committed to reduce emissions by 8 percent compared to the 1990 levels by 2012.¹⁰ With the EU accession rounds of 2004, 2008, and 2013 the new EU member states were also integrated into the ETS and the low-carbon targets, along with Iceland, Liechtenstein, and Norway.

While the EU ETS was established to help EU member states meet their commitments under the Kyoto protocol, it functions as one of four legislative instruments developed to achieve the so-called 20-20-20 targets set by EU leaders in 2007 and enacted in 2009 with the climate and energy package. The targets provide a common framework for member states to pursue low-carbon development. More specifically they consist in: reducing GHG emissions by 20 percent from levels in 1990, raising the share of renewable energy resources consumed in the EU to 20 percent, and improving of energy efficiency by 20 percent by 2020.¹¹ The climate and energy package includes national targets for reducing and monitoring emissions not included in the ETS, national targets for increasing renewable energy sources, and legislation setting the bases for developing of carbon capture and storage facilities.¹² The EU energy efficiency directive, which EU member states were required to implement by June 2014 (with some limited exceptions), was drafted separately, but is also considered instrumental to the achievement of the 20-20-20 goals. EU planning also takes into consideration the wealth and base level of member states, requiring countries with better environmental infrastructure to commit to higher targets (this is consistent with the approach used for the Kyoto protocol commitments).

The EU GHG emission market has been implemented in three distinct phases. Phase I (2005-2007) was officially launched the same year the Kyoto protocol entered into effect. This initial

⁹ European Commission, *The EU Emissions Trading System (EU ETS) Factsheet*, 1.

¹⁰ Pew Center on Global Climate Change, *The European Emissions Trading Scheme (EU-ETS) Insights and Opportunities* (Center for Climate and Energy Solutions, 2005), 2. <http://www.c2es.org/docUploads/EU-ETS%20White%20Paper.pdf>.

¹¹ "The 2020 Climate and Energy Package," *European Commission*, last updated July 9, 2014, http://ec.europa.eu/clima/policies/package/index_en.htm.

¹² Ibid.

phase served as a testing ground to help develop necessary institutions and provide an adjustment period to firms and human capital.¹³ The system was adopted by all the twenty-five EU member countries at the time and covered only CO₂ emissions from combusting installations.¹⁴ Permits applied to the plants themselves instead of the company.¹⁵ The national governments allocated most of the allowances for free.

Member countries were entirely responsible during this period for permit allocation and emission monitoring. National governments submitted National Allocation Plans (NAP) to the Commission for review, describing how they intended to implement the ETS and meet the country's commitments under the Kyoto protocol. The Commission could request changes to some of the plans. In practice, the few revision requests related to scenarios where the volume of allowances exceeded projected emissions and when member states planned to redistribute permits after the initial allocation.¹⁶ Beyond the design of the system, the Commission's role was limited to ensuring that all countries followed its directives and developed responses to issues as they emerged. Each member country was responsible for identifying the right number of allowances to issue and establishing proper monitoring and enforcement mechanisms.¹⁷

The EU ETS Phase I has been mostly criticized for the over allocation of permits by member states despite the Commission's recommendations and subsequent windfall profits for companies with excess allowances.¹⁸ Lack of reliable data and harmonized practices meant that national governments were allowed to use various methods to distribute emission allowances, leading to their

¹³ Peter Sopher and Anthony Mansell, "European Union" in *The World's Carbon Markets: A Case Study Guide To Emissions Trading* (Washington, DC: Environmental Defense Fund and International Emission Trading Association, March 2014), 2.

¹⁴ Richard Mao et al., *Environomist: China Carbon Market Research Report 2014* (Beijing: Environomist Ltd., 2014), 11-12.

¹⁵ Ibid.

¹⁶ "National Allocation Plans," *European Commission*, last updated July 9, 2014, http://ec.europa.eu/clima/policies/ets/pre2013/nap/index_en.htm.

¹⁷ Ibid.

¹⁸ Tim Laing et al., *Assessing the Effectiveness of the EU Emissions Trading System* (Centre for Climate Change Economics and Policy, January 2013), 23.

over allocation.¹⁹ To counter this trend, the Commission rules that licenses from the 2005-2007 period could not be used in the second phase.²⁰ The Commission's own assessment highlighted the lack of transparency and the time-consuming procedures involved with the NAP.²¹ It also concluded that firms need clear signals from institutions in order to adjust production accordingly before new rules are put into place.²²

Phase I of the EU ETS was always designed to be a trial test to identify flaws and develop institutional competencies. The Commission expected Phase II (2008-2012) to correct issues that emerged in previous years in order to target emissions more effectively. The changes in the ETS Directive—the legal basis for the cap and trade program—strengthened the system by streamlining procedures, improving transparency, and reducing the number of allowances.²³ The global financial crisis, however, created several unforeseen challenges for policymakers. First of all, the recession dampened some governments' commitment to implement a program that might place a burden on producers and significant exemptions were introduced to aid struggling industries throughout Europe. Even more importantly, as economic activity slowed down so did emissions. The fall in emissions not only lowered the market price for carbon, it made it significantly harder to assess the effectiveness of the program.²⁴ While the Commission reduced the volume of allowances by 6.5 percent compared to 2005, the demand fell even faster; the result was that many installations held on to unused permits, suppressing the market price.²⁵ Part of the problem was that projected emissions were based on reported emissions from the

¹⁹ Lucas Merrill Brown, Alex Hanafi, and Annie Petsonk, *The EU Emissions Trading System: Results and Lessons Learned* (Washington, DC: Environmental Defense Fund, 2012), iv. <http://www.edf.org/climate/eu-emissions-trading-system-report>.

²⁰ "EU ETS 2005-2012," *The European Commission*, last updated July 9, 2014, http://ec.europa.eu/clima/policies/ets/pre2013/index_en.htm.

²¹ "National Allocation Plans."

²² *Ibid.*

²³ Peter Zapfel and Vicky Pollard, "The EU ETS: A Review of the Back-Loading Debate," in *Emissions Trading Worldwide ICAP Status Report 2014*, eds. Constanze Haug et al. (International Carbon Action Partnership, 2014), 8. <https://icapcarbonaction.com/news-archive/209-emissions-trading-worldwide-icap-status-report-2014>.

²⁴ Laing et al., *Assessing the Effectiveness of the EU Emissions Trading System*, 9.

²⁵ "National Allocation Plans"; Merrill Brown, Hanafi, and Petsonk *The EU Emissions Trading System*, 11-12.

previous periods, meaning that the early over allocation by national government persisted into the second phase as well.

The most visible changes during Phase II were the expansion to twenty-seven countries (to include the new EU members Bulgaria and Romania) and the inclusion of nitrous oxide (N₂O) in the system. The Commission also established a series of directives to standardize the NAP and provide more information to the public to promote transparency. To this end, in 2012, it launched a public European Union Transaction Log (EUTL), an online database that collects all information on permits and installations participating in the ETS. The EUTL replaced the national registries to ensure consistency, prevent double accounting and fraud, and systematize permit registration across countries.²⁶ This was also a preliminary step in shifting permit issuance from the individual member states to the Commission.

After 2008, fines were raised from forty euros per ton of carbon to one hundred euros per ton.²⁷ Single member states remained responsible for monitoring, reporting, and verification (MRV). Given the EU bureaucratic structure, the Commission cannot directly enforce regulation in the member countries nor can it carry out large-scale MRV activities directly. Since the different member countries have very different budgets and environmental policies, the Commission found it significantly more challenging than anticipated in early feasibility studies to ensure a homogeneous level of compliance with its directives on the ETS across countries.²⁸

The EU ETS entered Phase III in 2013 and is planned to last through 2020. The new system includes a set of more stringent rules, including the shift from national to EU-level permit approval.²⁹ The Commission is now directly responsible for auctioning and allocating permits and the NAP has been discontinued. This allows the Commission to reduce the number of allowances and to coordinate the inclusion of new sectors into the scheme. Among those permits

²⁶ “Union Registry,” *European Commission*, last updated July 9, 2014, http://ec.europa.eu/clima/policies/ets/registry/index_en.htm.

²⁷ Mao et al., *Environmentalist*, 11.

²⁸ Braden Smith, “Transnational Carbon-Trading Standards: Improving the Transparency and Coordination of Post-Kyoto Carbon Trading Markets,” *Pace Environmental Law Review* 30, no. 1 (Fall 2012): 368.

²⁹ Mao et al., *Environmentalist*, 12.

that are being approved, more are being auctioned rather than allocated in a gradual move toward a fully market-driven system.

With regard to MRV, the Commission continues to play an important role in harmonization and oversees the so-called compliance cycle. Operators are required to self-report using electronic templates and are verified by an accredited third party by March 31 every year; they must then submit the appropriate number of allowances by the following April 30.³⁰

Overall, the system relies heavily on the presence of a central regulator that can ensure common standards, consistency over time, and credibility. This is especially the case when differences in national policies, budget allocations, and laws create regional discrepancies. As a consequence the Commission is becoming increasingly important, and its role is crucial in a market that is still developing. In addition to monitoring pricing, the standards it sets help bolster operators' confidence by ensuring low corruption and credible accreditation for third party verifiers. On the other hand, the lack of credible institutions has created some controversy in the approval of offsetting investments, or the credits earned by GHG emitters through the funding of projects in developing countries, particularly in the case of the Clean Development Mechanism (CDM).

Whatever its effectiveness in offsetting global GHG emissions, the CDM has been one of the main channels through which the EU has influenced China's emission reduction strategies. The CDM as established in the Kyoto protocol is aimed at promoting emission-reduction investments in developing countries. It was hoped that this mechanism would reduce overall emissions while introducing low-carbon technology and market-driven tools for environmental management in lower income countries.³¹ There has also increasing scrutiny of these projects due to what has become known as the question of "additionality." This refers to a foreign company funding projects abroad to offset its domestic emissions

³⁰ "Monitoring, Reporting and Verification of EU ETS Emissions," *European Commission*, last updated July 9, 2014, http://ec.europa.eu/clima/policies/ets/monitoring/index_en.htm.

³¹ Lucas Merrill Brown, Alex Hanafi, and Annie Petsonk, *The EU Emissions Trading System: Results and Lessons Learned* (Washington, DC: Environmental Defense Fund, 2012), 23. <http://www.edf.org/climate/eu-emissions-trading-system-report>.

that would have been carried out built regardless—undermining the very idea of a carbon emission-offsetting project. For example, the government of a given country may have already scheduled to build a renewable energy power plant, but by making it appear as though this project was designed for the CDM it can obtain external funding in this way. The problem with this is that if the CDM recipient country would have carried out the project anyway then the mechanism is not bringing any benefit—and EU companies are not truly offsetting their emissions, and there is no additional emission reduction taking place. Until 2013 China was the largest recipient of CDM projects, and the country where the issue of additionality was allegedly most common. As a consequence the EU in 2011 announced that starting in 2013 it would accept only offsets from projects carried out in least developed countries, making BRIC countries like China ineligible.³²

The European firms funding the CDM projects established a market and local stakeholders with strong interests. The latter have become players in the Chinese ETS debate as they hoped to receive domestic funds to replace the European ones to fund their renewable projects after the latter are phased out.³³ It is no secret that the Commission hopes to link the EU ETS to other carbon markets to ensure the long-term sustainability of the project and make the program more effective.³⁴ An agreement was made with Australia to link its ETS with the European one by 2015, but the new government in Canberra repealed the legislation for carbon pricing, effectively dismantling its carbon markets, in July of this year.³⁵ The EU Climate Action Commissioner Connie Hedegaard was quick to express regret and clarify that the dialogue over linking the EU ETS

³² Bo and Freeman, “Making Sense of Carbon Market Development in China,” 198.

³³ Ibid.

³⁴ “International Carbon Market,” *European Commission*, accessed March 21, 2014, http://ec.europa.eu/clima/policies/ets/linking/index_en.htm.

³⁵ Michelle Innis, Stanley Reed, and Coral Davenport, “Australia Tax Repeal Is Big Blow to Fight Against Emissions,” *The New York Times*, July 17, 2014, <http://www.nytimes.com/2014/07/18/business/international/australia-tax-repeal-is-big-blow-to-fight-against-emissions.html>; Lenore Taylor, “Australia Kills off Carbon Tax,” *The Guardian*, July 17, 2014, <http://www.theguardian.com/environment/2014/jul/17/australia-kills-off-carbon-tax>.

to Australia's would be discontinued.³⁶ Thus, China, a new player in this field, may have already become one of the EU ETS' best hopes for the future.

China's Emission Trading System

Since 2013, six pilot markets started operating in Guangzhou, Beijing, Shanghai, Hubei, Tianjin, and Shenzhen. Chongqing was the last market to start trading in July 2014, while the city of Hangzhou is also in the process of developing its own market.³⁷ The current Director General of Climate Change at the National Development and Reform Commission (NDRC), Su Wei, recently declared that emissions from heavy polluters such as Hebei, as well as Inner Mongolia and Shanxi, could be regulated through a carbon market in the near future, signaling the powerful agency's commitment to a nation-wide scheme.³⁸ There are already agreements among other administrative units that are considering developing their own ETS, including Hangzhou and Suzhou. Hebei, Inner Mongolia, Shanxi, and Shandong signed an agreement for future cooperation with Beijing in developing their ETS.³⁹ These trends point to a strategy of gradual expansion of individual systems rather than creating a top-down regulatory framework like the European one.⁴⁰

The Chinese government's decision to launch several pilots at the same time in 2011 reflects the NDRC's aggressive push to find more effective, market-driven systems to manage pollution control, coupled with a well-established approach of testing policies at the

³⁶ "Connie Hedegaard: 'The EU Regrets the Repeal of Australia's Carbon Pricing Mechanism'," *European Commission*, July 17, 2014, http://ec.europa.eu/commission_2010-2014/hedegaard/headlines/news/2014-07-17_01_en.htm.

³⁷ "International Carbon Action Partnership (ICAP)," *International Carbon Action Partnership*, accessed May 2, 2014, <https://icapcarbonaction.com>.

³⁸ Kathy Chen and Stian Reklef, "China Says Could Add Big-Polluting Regions to Carbon Market," *Reuters*, May 1, 2014, <http://www.reuters.com/article/2014/05/01/us-china-carbon-idUSKBN0DG0AG20140501>.

³⁹ "Beijing Starts China's Third Carbon Exchange With First Trades," *Bloomberg*, November 29, 2013, <http://www.bloomberg.com/news/2013-11-29/beijing-starts-china-s-third-carbon-exchange-with-first-trades.html>.

⁴⁰ While it is true that Denmark and the UK already had voluntary markets in place, which did provide some inspiration for the EU ETS, they were not established through a EU-wide effort and did not have as large of an impact as the phase I in the development of institutions beyond those individual countries.

local level before implementing them at the national level.⁴¹ China has been remarkably successful in creating regulatory frameworks *ex facto*, legitimizing practices that emerged at the local level (usually in response to broad directives at the central level). This is meant to mitigate political risk tied to establishing a nation-wide system, identify a successful model, and rectify problems on a smaller scale.

There are however some risks tied to the ground-up policy: a successful ETS requires a sophisticated bureaucratic apparatus and technology to guarantee market mechanisms, as well as administrative capacity to carry out MRV activities and enforce punishments and compliance. It is unclear if local governments can muster the resources needed for this kind of project. In the case of the EU, the Commission's directives function within a highly regulated legal framework aimed at standardizing national policies. In China, the NDRC will also be important as a harmonizing force in what remains a very fragmented system, ranging from the highly regulated and splintered energy and financial markets to decentralized decision-making by local governments. Allowing each pilot to experiment with very different rules will undoubtedly create problems in creating a single market. While the UK and Denmark already had voluntary ETS, which provided models for the EU ETS, the union-wide market itself was developed separately. It remains to be seen if the benefits of promoting creativity and testing will outweigh the problems in coordination that will emerge. A plan for a countrywide ETS is likely to be announced in the next five-year plan in 2016, and NDRC officials have made public statements setting 2018 as the launch date for a national ETS.⁴²

It is still early to assess the successes and failures of the individual schemes, which are still in an experimental phase. All of the pilots' initial trading periods, however, are scheduled to end in 2015, which means that policymakers are already analyzing achievements and failures.⁴³ The main traits of the programs already reveal some of

⁴¹ Bo and Freeman, "Making Sense of Carbon Market Development in China," 196-197.

⁴² Gerard Wynn, "China Expects to Launch National Carbon Market in 2018-Govt Official," *RTCC*, May 30, 2014, <http://www.rtcc.org/2014/05/30/china-expects-to-launch-national-carbon-market-in-2018/>.

⁴³ "Diving into the Details: Planned and Operating Emissions Trading Schemes Around the World," in *Emissions Trading Worldwide ICAP Status Report 2014*, eds. Constanze Haug et al. (International Carbon Action Partnership, 2014), 47-53.

the issues that might emerge in the future. All pilots report emissions and comply with monitoring yearly, although allowances are issued annually in some systems and for the entire period in others.⁴⁴ So far CO₂ is the only emission traded on any of the markets although government officials have indicated that, similarly to the EU ETS, more types of emissions may be included in the future.

All pilot markets in force at the time of writing monitor emissions by firm; this is different from the EU ETS, which targets single installations.⁴⁵ Because all Chinese pilots require compliance from firms that emit above a certain threshold, companies could potentially evade restrictions by breaking up into smaller legal entities. This would create an even larger number of polluters that can evade controls more easily due to their size. On the other hand, firm-level monitoring reduces the burden on local governments, whose resources dedicated to the ETS MRV are likely to be spread thin already. This practical consideration may have played a role in the decision to opt for firm-level monitoring.

The ETS pilots vary in terms of the industries and sectors covered. For example, Shanghai's ETS includes airlines and key service industries, Beijing and Tianjin require compliance from large public buildings, and Guangdong and Shenzhen are considering incorporating the transportation sectors.⁴⁶ This diversity in requirements may facilitate in the long run the extension of the ETS to a wider variety of players, something that the EU cap and trade program has struggled with—as proved by the controversies surrounding the expansion to include flight emissions.⁴⁷ This remains speculative, as it is still unclear what a nation-wide ETS would look like in China.

The expansion of the ETS to include a broader number of polluters is likely to take place at the local level before we even see a national scheme. Already, all ETS pilots require a broad number of

⁴⁴ Ibid.

⁴⁵ Mao et al., *Environmentalist*, 49.

⁴⁶ “Diving into the Details: Planned and Operating Emissions Trading Schemes Around the World,” 47-53.

⁴⁷ Smith, “Transnational Carbon-Trading Standards,” 334; Susanna Twidale and Barbara Lewis, “EU Compromise on Airline Emissions Faces Opposition,” *Reuters*, March 13, 2014, <http://uk.reuters.com/article/2014/03/13/eu-ets-aviation-idUKL6N-0MA2CM20140313>.

firms in different sectors to report on their emissions on several types of GHG.⁴⁸ The Shenzhen leadership has already announced its plans to gradually expand the ETS to those sectors that are currently only being monitored.⁴⁹ In all cases, an expansion in the next couple of years would represent an ambitious goal; challenges include highly regulated markets that prevent energy companies from passing costs to consumers, low local government capacity to enforce compliance, and the trading of allowances between different markets that have non-harmonized standards.⁵⁰

The Development and Reform Commissions (DRCs), the local branches of the NDRC, are the main institutions responsible for developing and implementing the ETS pilots. This ensures some level of coordination through the NDRC and the State Council. Even if the NDRC is not imposing standards at this time, it will be more able to do so by acting through the DRC rather than other, less powerful, local agencies.

The involvement of other actors in the design of the ETS, including universities, research centers, and exchange platforms could also produce a positive spillover effect in terms of developing human capital and institution building. This will be very important to establish a nation-wide system, especially given the need to strengthen overall technical capacity, MRV, and enforcement mechanisms. Some international institutions like the Asian Development Bank and the World Bank (through its Partnership for Market Readiness initiative) have already provided financial and technical support for the development of the ETS pilots and other low-carbon projects.⁵¹ The EU-China Partnership on Climate Change, established in 2005, provides a framework for collaboration between the two regions and EU institutions have already been cooperating with China on

⁴⁸Mao et al., *Environmentalist*, 6.

⁴⁹ China Emissions Exchange, "China's First ETS: A Brief Introduction to the Shenzhen Carbon Market," in *Emissions Trading Worldwide ICAP Status Report 2014*, eds. Constanze Haug et al. (International Carbon Action Partnership, 2014), 18, <https://icapcarbonaction.com/news-archive/209-emissions-trading-worldwide-icap-status-report-2014>.

⁵⁰ Bo and Freeman, "Making Sense of Carbon Market Development in China," 196-197.

⁵¹ More information on the projects funded by the Asian Development Bank and the World Bank are available on the organizations' websites: "Advancing Shanghai Carbon Market through Emissions Trading Scheme," *Asian Development Bank*, 2012, <http://www.adb.org/projects/46054-001/details>; "China," *Partnership for Market Readiness*, 2013, <https://www.thepmr.org/country/china-0>.

developing more sustainable paths to urban development, particularly for the low-carbon city project in Tianjin.⁵² Recent reports indicate that cooperation on GHG market development may soon increase; the Directorate-General for Development and Cooperation (EuropeAid) has hired an American consulting firm to help it specifically on this issue.⁵³

Challenges

While it is difficult to evaluate the current challenges faced by policymakers implementing the pilots without qualitative and quantitative data, it is possible to assess them on the basis of the fundamental requirements for any ETS. For a carbon emission market to function there is a need for an emission cap, permits (allowances), a market platform for the trading of permits, enforcement, and monitoring mechanisms.⁵⁴ Without effective enforcement and monitoring, permits will lose value. Similarly, if there is no way to effectively trade the allowances, then the whole system is bound to fail. Finally, a cap is necessary to achieve an actual reduction of emissions. Overall, the experience of the EU ETS suggests that strong institutions with significant central coordination are important in establishing a cap and trade system that is sustainable in the medium-term. Given the current level of decentralization it will be interesting to see whether linking independent local schemes—the current trend in China—will lead to the development of an effective national cap.

Hard Cap

The advances made in developing institutions by the NDRC and

⁵² “Joint EU-China Climate Statement: Chief Executive of EU Climate Initiative Responds,” *Climate-Kic*, April 2, 2014, <http://www.climate-kic.org/press-releases/joint-eu-china-climate-statement-chief-executive-of-eu-climate-initiative-responds/>.

⁵³ “US Consultancy ICF Wins Bid to Help Plan China Carbon Market,” *Reuters*, January 30, 2014, <http://www.reuters.com/article/2014/01/30/china-carbon-idUSL3N0L412J20140130>; “ICF International Wins €5 Million European Commission Contract to Support Development of Emissions Trading Systems in China,” *ICF International*, January 29, 2014, <http://www.icfi.com/news/2014/01/icf-wins-european-commission-contract>.

⁵⁴ Bo and Freeman, “Making Sense of Carbon Market Development in China,” 200-202.

the local DRCs over the past three years are remarkable, especially in developing mechanisms for monitoring and enforcing fines for non-compliant firms. However there is still much more to be done.⁵⁵ For example, at the moment only one pilot—Chongqing’s—has established a hard cap (for the year 2013 it was set at 125 Mt CO₂; annual reduction factor: 4.13%), and since the program only started in June 2014 it is too early to assess its effectiveness.⁵⁶ Other pilots are opting instead for carbon emissions per GDP reduction targets.⁵⁷ In recent statements, He Jiankun, chairman of China’s Advisory Committee on Climate Change, announced that a hard cap on carbon emissions would be announced in the next five-year plan (2016-2020).⁵⁸ However, the modalities through which the cap would be implemented—for example if this would be announced along with a national system or for individual markets—have so far not been addressed.

The EU adopted a hard cap approach for its ETS from the beginning, even though during Phase I national governments allocated enough allowances to make the cap effectively null. Similarly, overestimating emissions for the 2008-2012 period also led to low carbon permit prices and to some plants holding excess allowances. The rules were, however, already in place and firms were aware of the inevitability of having to eventually have to reduce their emissions overall. Providing firms with good information that can help them make the right decisions to improve efficiency is key to ensuring the success of a carbon market. With the centralization of EU ETS permit auctioning and approval, now handled directly by the Commission, there has been a renewed push to control emissions through permit scarcity.

Monitoring and Enforcement

Monitoring and information are also important factors to the success

⁵⁵ Ibid., 196.

⁵⁶ “Chongqing Pilot System,” *International Carbon Action Partnership*, accessed July 22, 2014, <https://icapcarbonaction.com>.

⁵⁷ Mao et al., *Environomist*, 10-28.

⁵⁸ Kathy Chen and Stian Reklef, “China Plans Absolute CO₂ Cap from 2016,” *Reuters*, March 6, 2014, <http://uk.reuters.com/article/2014/06/03/china-climatechange-idUKT9N0NH02W20140603>.

of an ETS; the Chinese government has a poor track record when it comes to enforcing environmental regulation, especially at the local level. If the ETS permits were revealed to be worthless due to the lack of effective monitoring and enforcing this would have serious repercussions on the credibility of the system as well as its effectiveness. This is already one of the major challenges in international trading, especially for middle income and developing countries; it has also been an issue for CDM projects.⁵⁹

In the EU, credibility of the system depends on strict guidelines on how member states implement monitoring and reporting regulation and third party accreditation and verification. Emissions must be reported using the standard templates available on the Commission's website; the report then has to be verified by accredited third party agencies that comply with the guidelines and ISO standards.⁶⁰ Reports must be made available to the public to ensure transparency and promote oversight from civil society. Key to the success of the system is the credibility of the accreditation system of the third party verifiers, who ensure that firms are up to the Commission's standards. The reliance on external verification also allows the Commission to collect information without over-extending its capacity. Without such mechanisms or the capacity to collect data on emissions and compliance, policymakers have a limited ability to assess the effectiveness of the program and the need to adjust permit prices.

The challenges the EU ETS faces in coordinating national allowance allocation and reporting are a poignant reminder that a system is only as effective as its implementation. Chinese policymakers are already wary of the danger posed by pressure on local governments to protect domestic industry. The cozy relationship between the business sector and local governments, especially in the case of State Owned Enterprises (SOEs), has been a big obstacle to enforcing environmental protection regulation in China in general. It would not be unthinkable for local governments to overestimate emissions and suppress the price of carbon in the short term to benefit local SOEs, following the EU pattern. The best solution is to ensure access to reliable information regarding emissions at the local level

⁵⁹ Smith, "Transnational Carbon-Trading Standards," 329-335.

⁶⁰ "Monitoring, Reporting and Verification of EU ETS Emissions."

to the authorities managing the ETS so that they can act upon it to adjust the number of permits and monitor emissions. In addition to ensuring effective monitoring, policymakers will have to consider establishing a unified register as they explore the possibility of links with other markets.

In creating a fully integrated national carbon market, the NDRC will also have to harmonize enforcement and monitoring practices, and ensure that a strong certification system for third-party verifiers is put into place. All the pilots allow between 5 percent to 10 percent or less of emissions to be offset through domestic carbon reduction projects certified through the China Certified Emission Reduction (CCER), which is modeled after the CDM. There will be a need to ensure high national standards in the CCER projects as well to boost the credibility of the program.

Financial and Legal System

A whole other set of problems arises when looking at the underdeveloped financial markets in China. While the EU is composed of sovereign countries and has no real central executive power, its financial markets are both sophisticated and highly integrated. Property rights are also well protected and investors and firms have access to a broad array of credible legal instruments. China's highly controlled capital markets and still-transitioning legal system thus could pose an obstacle in establishing a resilient carbon permit exchange.⁶¹ Opening the financial system and encouraging financial innovation as announced during the Third Plenum of the Eighteenth Central Committee in November 2013 will be key to the success of emission trading.⁶²

Any changes to the financial and legal system would have to be centrally mandated, with the possible exception of the Shanghai Free Trade Zone (FTZ). This creates a problem for local governments that do not have the power to make this kind of reform on a

⁶¹ Bo and Freeman, "Making Sense of Carbon Market Development in China," 202.

⁶² "CCP Central Committee Resolution Concerning Some Major Issues in Comprehensively Deepening Reform," *China Copyright and Media*, trans. Rogier Creemers, November 15, 2013, <http://chinacopyrightandmedia.wordpress.com/2013/11/15/ccp-central-committee-resolution-concerning-some-major-issues-in-comprehensively-deepening-reform/>.

local level. Similarly, the central government would have to remove price caps to achieve deregulation in the energy market. This will be crucial for the success of those ETS pilots that include emissions from heating and electricity (for example, Beijing and Shanghai). If utility companies are to achieve higher efficiency in the long term they will need to be able to pass some of the rising costs posed by the cap and trade program to consumers.⁶³

Without a nation-wide ETS, polluting firms may find it less costly to move to less populated and regulated areas in the western part of the country rather than invest in research and development to reduce emissions. Policies such as subsidies and tax-breaks that encourage companies to relocate to western provinces to promote economic growth in the less developed areas of the country have already been in place for over a decade. There is growing evidence that the government is now pursuing such policies with the further objective of reducing environmental pressure on the densely populated eastern cities, for example by establishing large coal bases in northwestern China that include coal mines, power plants and chemical plants.⁶⁴ Moving polluting industries away from urban centers would do nothing to reduce overall emissions or to improve efficiency, but it might slightly improve air quality in the short term for some cities. The lack of public plans for emissions trading schemes in western, poorer regions of the country could thus indicate a lack of commitment to cutting GHG emissions.

The Way Forward

One of main differences in the development of carbon markets in China and the EU observed so far has been the top-down approach of the latter versus the ground-up method of the former. While differences in the two political systems and institutional experience

⁶³ Bo and Freeman, "Making Sense of Carbon Market Development in China," 202.

⁶⁴ "China Outsourcing Smog to West Region Stirs Protest," *Bloomberg News*, March 7, 2014, <http://www.bloomberg.com/news/2014-03-06/china-outsourcing-smog-to-west-region-stirs-protest.html>; Richard Martin, "The Great Coal Migration," *Fortune* 170, no. 1 (July 21, 2014): 14–16; Edward Wong, "China's Energy Plans Will Worsen Climate Change, Greenpeace Says," *The New York Times*, July 23, 2014, <http://www.nytimes.com/2014/07/24/world/asia/greenpeace-says-chinas-energy-plans-exacerbate-climate-change.html>.

in conducting reform and consolidating power explain the relative advantages to a decentralized approach for creating ETSs in China, there are significant risks as well. In addition to the challenges posed by market reform, budgets, monitoring capacity, and standardization, there is also the question of what role the ETS will play in the broader environmental protection strategy.

Without a broader environmental policy framework, an ETS can only achieve limited results. The EU system is part of a set of tools aimed at placing incentives for firms and households to reduce carbon consumption and improve efficiency. Even so, there is an ongoing debate over the actual impact that the ETS has had on curbing emissions. A 2013 working paper published by the UK-based Centre for Climate Change Economics and Policy and The Grantham Research Institute on Climate Change and the Environment surveyed several studies and found that most agreed that the reduction in total capped emission due to the ETS (as opposed to other policies and the economic crisis) has been between 2 and 3 percent, or about 40–80 MtCO₂.⁶⁵ Can China do better?

Enforcement mechanisms and technical expertise do not emerge from a vacuum. While Beijing, Tianjin, and Shanghai have run voluntary trade exchanges since 2008, there is still an institutional and human capital gap to be filled.⁶⁶ The National People's Congress adopted a new environmental protection law last April that offers a legal framework for pursuing more aggressive environmental policies and seems to demonstrate renewed commitment to ensuring energy independence.⁶⁷ There may still be, however, a learning curve facing China's policymakers and enforcement agencies, which will need a larger staff and budget as well as enhanced legal instruments. Incentive structures will also have to be put in place, for example by making officials accountable for the performance of the ETS, which could provide a tangible, measureable standard to ensure local governments' commitment. The central government has used the cadre evaluation system to prioritize policies promoting

⁶⁵ Laing et al., *Assessing the Effectiveness of the EU Emissions Trading System*, 25.

⁶⁶ Peter Sopher and Anthony Mansell, "China," in *The World's Carbon Markets: A Case Study Guide to Emissions Trading* (Washington, DC: Environmental Defense Fund and International Emission Trading Association, March 2014).

⁶⁷ "China's Legislature Adopts Revised Environmental Protection Law," *Xinhua*, April 24, 2014, http://news.xinhuanet.com/english/china/2014-04/24/c_133287570.htm.

GDP growth at the local level for decades. The top leadership has already signaled that it intends to reform it to include environmental targets as well. This will be important also because the DRCs rather than Environmental Protection Bureaus (EPBs) that answer to the Ministry of Environmental Protection (MEP), are managing the pilots. The DRCs are generally considered more powerful than the EPBs and are more likely to have the resources and leverage to overcome the gaps in enforcement however they are responsible for economic development as well as the ETS.

The Chinese leadership appears to be invested in establishing an effective national ETS; this does not mean that all the ETS pilots must be successful. The European experience suggests that an initial pilot period is likely to be more useful in identifying design flaws and building political and institutional support than reducing emissions per se. Continued central government involvement, however, is important to ensure the emergence of a functioning ETS, leading to an actual reduction in emissions.

The EU has already provided significant technical and financial support to China's environmental programs. It should continue to do so, but with an eye to developing better relations between China, the EU, and its member states. An ETS would be a powerful way to mobilize China's green investment capability—something that could have a massive impact globally. Given the EU and several of its member states' expertise in this field, there is a great potential for mutually beneficial collaboration. Developing common standards for future trading and third party monitoring could be a possible joint research topic for the DRCs and the Commission. It could also provide a basis for dialogue ahead of the UNFCCC Paris conference next year, especially given the history of mistrust between European countries and China in climate change diplomacy over the past few years. Similarly, building on the experience with previous CDM projects, private investors could be encouraged to work with the Chinese local governments to develop new environmentally friendly infrastructure.

In conclusion, the future of the Chinese ETS pilots remains hard to read. The schemes are still in what can be defined as a “learning-by-doing” phase, comparable to the EU ETS's Phase I. To

avoid some of the pitfalls experienced by the EU system, Chinese policymakers will have to ensure that good monitoring and verification systems are in place. These may hinge on the credibility of third party accreditation. More central coordination and comprehensive financial, legal, and pricing reform will also be needed at some point in order for the schemes to succeed. It is likely that in this process, pressure on the central leadership to demonstrate progress on air pollution and climate change will be crucial. It will be the central leadership's responsibility to ensure that economic, legal and administrative reforms continue to support efforts at the local and national level to establish successful carbon markets throughout the country.