



Establishing an Emissions Trading System in China under the Twelfth Five-Year Plan Policy Considerations

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This paper is an original contribution to IDDRI's Learning Platform initiative on climate policies by the State Information Centre of China (SIC). It was commissioned in the framework of the international conference "China Emissions Trading System Establishment Based on Global Experiences", co-organised by SIC and IDDRI (Beijing, July 2011). Main conclusions and key findings drawn from this event have largely contributed to the preparation of this paper. Findings, interpretations and conclusions expressed in this paper remain those of the authors and are not those of SIC and IDDRI's boards.

1. INTRODUCTION

In early 2011, the Chinese government issued an outline of the Twelfth Five-Year Plan, which clearly indicated its intention to gradually establish a carbon emissions trading system (ETS). Two provinces and five cities (including rural areas) have already been selected for implementing pilot ETS by 2013. By 2015, ETS will be gradually expanded to encompass the whole country. This is a key part of the Twelfth Five-Year Plan, under which ETS establishment in China is set to develop at full speed and become an increasingly important policy tool for the control of greenhouse gas emissions and the promotion of low-carbon development in the future.

At present, nine countries and regions around the world are operating emissions trading systems. Four are well advanced in their ETS design and implementation plans; and eight other countries are considering or setting up plans for ETS implementation (see Table 1). Some policy recommendations in this paper are based on a survey and summary of these international cases, in particular, the EU ETS, which is so far the largest and most effective ETS in the world. Policy recommendations are also based on meetings between State Information Center of China (SIC) in May 2011 with some major European stakeholders highly involved in EU ETS and on the results obtained from the international conference "China Emissions Trading System Establishment Based on Global Experiences", co-organised by SIC and IDDRI (July 2011).

This paper is organised as follows. Section 2 briefly summarises key concepts of ETS and its importance to China. Section 3 provides ten major recommendations for a solid ETS implementation and functioning in China. As a next step, researchers and policy-makers will conduct visits to Europe and more in-depth analyses on aspects related to ETS implementation in China.

Table 1. Development of Global ETS

Operating ETS		Planned ETS		ETS in early-planning stages
Name	Start date	Name	Start date	
New South Wales, Australia	2003	Western Climate Initiative (including 11 states in the USA and Canada)	2012	Korea
EU ETS	2005	California, USA	2012	Japan
Alberta, Canada	2007	Australia	-	Brazil
Switzerland	2008	American Clean Energy and Security Act of 2009	-	China
New Zealand	2008			Ukraine, Russia etc.
Regional Greenhouse Gas Initiative (RGGI), USA (including 10 North-eastern states)	2009			Chile
Tokyo, Japan	2010			Turkey
Carbon Reduction Commitment (CRC), UK	2010			Mexico
Norway	2005			

Source: from Hood, 2010

2. ETS: FUNDAMENTAL CONCEPTS AND IMPORTANCE TO CHINA

ETS consist of market-based mechanisms that are used to trade carbon dioxide emissions (and other greenhouse gases). A government body usually determines the scope of the market and sets a limit on the amount of allowed emissions. Emission permits of equal value are first allocated to market bodies, after which the liable entity can decide independently whether to reduce emissions or trade emission permits. After the completion of a trading period (usually one year), the quantity of verified emissions must equal the quantity of allowances surrendered by the liable entity. In addition, the establishment of supporting systems such as measuring, reporting, verification (MRV) systems and trading platforms is also necessary in order to ensure successful operation of the system.

In order to reduce emissions, caps must be set at a lower level than the market’s “business as usual” level of emissions in order to ensure market scarcity and generate emissions reduction efforts. In an ETS, businesses that encounter abatement costs higher than the market permit price can purchase more permits in order to cover rather than reduce emissions, whereas enterprises for which it is cheaper to reduce emissions can reduce emissions and sell their surplus emission permits for a profit, thereby providing an incentive for emissions reductions. Therefore, as long as the emission cap is not exceeded, the ETS market mechanism can exploit opportunities for low-cost emissions reductions and therefore minimise the overall cost of emissions abatement.

Reforms in China have already entered difficult times. The reform of the pricing regime for production factors (including energy products) now faces great obstacles. The only breakthrough of the reform bottleneck will be the introduction of new market-based policies. The establishment of an ETS could affect and even disrupt the existing policy system, thereby accelerating policy reforms and achieving economic transformation. This can be demonstrated in the following two areas:

First, the introduction of an ETS is a major breakthrough in the policy system of energy-saving and emissions-reduction in China.

An ETS is a highly market-oriented emissions-reduction measure that can theoretically and empirically achieve emissions-reduction targets at a lower cost relative to command and control policies, the latter being the dominant policies in China. This forms the basis and motivation for introducing emissions-reduction policies in China at present. It became clear that after the Eleventh Five-Year Plan (2006-2010), the space for the implementation of command-and-control policies was getting smaller. Therefore, the introduction of an ETS under the Twelfth Five Year Plan (2011-2015) would provide a good opportunity and a good starting point for gradually phasing out former high-cost approaches and forming a GHG policy regime based largely on market-based instruments, and therefore ensure the cost-effective achievement of energy-saving and emissions-reduction targets.

Second, the ETS could become a core industrial policy and promote the strategic adjustment of China’s economic structure.

An ETS introduces carbon pricing and changes both the horizontal price ratio between high and

Table 2. Coverage of Key ETS Worldwide

Key global ETS	Coverage by sector
NSW – ETS	Power sector
EU – ETS	Electricity + industry (large-scale emitters)
Alberta, Canada	Electricity + industry (large-scale emitters)
Switzerland	Power sector
New Zealand	All emission sources (except Agriculture)
RGGI, USA (including 10 north-eastern states)	Power sector
Tokyo, Japan	Commercial buildings + industry (large-scale emitters)
CRC, UK	Organisations consuming more than 6000mwh
Norway	Electricity + industry (large-scale emitters)
WCI 11 states in USA and Canada	In initial start-up period, electricity and large-scale emitters in industry (annual emissions >25,000tCO ₂ eq)
California, USA	In initial start-up period, electricity and large-scale emitters in industry (annual emissions >25,000tCO ₂ eq)

Source: from Hood, 2010

low-carbon products and the vertical price ratio between high and low-carbon processes in the industrial chain. As such it aims at encouraging consumers to purchase low-carbon products and also it guides investment toward low-carbon processes. This kind of push-pull effect can effectively incentivize the development of the entire low-carbon industry. In fact, this has proved to be the experience and direction of the EU ETS.

3. POLICY RECOMMENDATIONS FOR THE CONSTRUCTION OF AN ETS IN CHINA

An ETS is formed under artificial constraints and whether or not it is effective mostly depends on its scientific design. 2011 is the inaugural year of both the Twelfth Five-Year Plan (2011-2015) and the launch of the ETS in China and there is an urgent need for a market design plan that can effectively reduce energy-saving and emissions-reduction costs and successfully guide low-carbon consumption and low-carbon investment. In May 2011, the Economic Forecast Department of SIC sent staff to Germany and France to study the establishment of emission trading systems in Europe; in July 2011, an international forum, *China ETS Establishment Based on Global Experiences*, was held in Beijing in coordination with IDDRI to draw the lessons learned from the EU ETS experience. Based on such results, ten key policy recommendations for the establishment of an ETS in China are provided below.

Recommendation 1: During the initial set-up phase, introduce carbon-price sensitive sectors in the ETS.

Many factors must be considered when determining which sectors and businesses to introduce in the ETS; but during the initial developments,

the main contradictions must be grasped in order to allow the carbon market to optimise its core strengths. Therefore, enterprises with both low and high emissions-reduction costs should be included in the ETS. In theory, the wider the scope of emission sources in the ETS the better, but considering that the transaction costs increase along with the broadening of the scope, ETS often includes only a few sectors and businesses. Initially, the ETS will feel its way forward step-by-step and during this stage its industrial scope must be determined with great caution. The largest ETS in the world at present – the EU ETS – includes the power sector as well as other industrial sectors, and it only covers about 45% of total CO₂ emissions in Europe. The UK's Carbon Reduction Commitment (CRC) scheme, the New South Wales Emission Scheme (NSW - ETS) in Australia and the Regional Greenhouse Gas Initiative (RGGI) in the USA are similarly set up. The only exception is the ETS in New Zealand, which attempts to cover all emissions sources (see Table 2).

Because of weak foundations, the establishment of an ETS in China should initially be restricted to a limited range of businesses and sectors. Regarding the selection of sectors that it should cover, this paper recommends **first introducing carbon-price sensitive sectors into the ETS**. Opportunities for low-cost emission reductions are not distributed evenly through the economy and society as a whole, and are often concentrated in a number of particular sectors. Efforts to locate such sectors and accordingly establish an ETS within a limited scope can be very effective. In general, carbon-price sensitive sectors often provide more opportunities for low-cost emissions reductions.

The Environmental Protection Agency (EPA)

in the US used a model to simulate the responses of different sectors to the introduction of an ETS. The results of the study (see Figure 1) show that when sectors such as power and transport enter the market simultaneously, the former, which is most sensitive to carbon prices, shows the greatest reduction in emissions while the transport sector is slower to react. Therefore, in 2010, the US issued a plan for the establishment of an ETS centred on the power sector.

The State Information Centre’s computable general-equilibrium model (SIC-GE) has also conducted similar forecasts at the Chinese level: if the price of carbon emissions in an ETS is set at 100 yuan t/CO₂ (roughly 11-12 euro/tCO₂), short-term emissions reductions in different sectors (compared to 2007 levels) would be as follows: (see Figure 2)

The results show that the power sector is the most sensitive to carbon prices in China, after which other high-energy consumers such as the steel, coal mining and chemical industries also demonstrate relatively high levels of sensitivity. Therefore, these should be the first sectors to be included into an emissions trading system.

Recommendation 2: Allow inter-provincial trade as soon as possible in order to clear differences in emissions-reduction costs

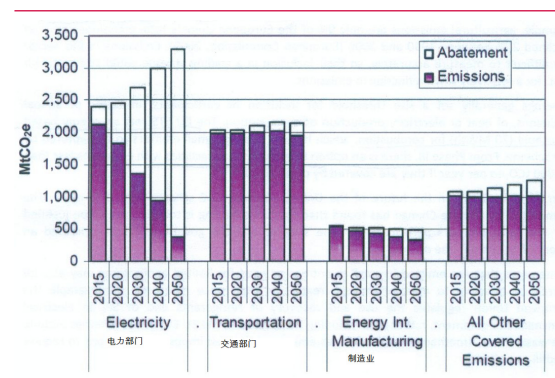
Under an ETS, the greater the difference in emissions-reduction costs between liable entities in the market, the more effective it is at reducing overall emissions-reduction costs. Research results of SIC, which used provincial input-output tables from 2007, show much higher sectoral carbon intensities in less-developed regions (Western China) than in developed regions (Eastern China) (See Figure 3). This demonstrates a significant difference in levels of technology and implies a huge gap in the potential for emissions reduction and its cost. Therefore, inter-provincial trading should be realised as soon as possible.

Recommendation 3: Future emissions caps in China should be tied to carbon intensity targets

Emissions caps directly reflect the effectiveness of an ETS at reducing emissions; overly relaxed caps indicate that the market is not efficient to reduce emissions. In addition, emissions caps determine the scarcity of permits in the ETS, which directly affects carbon-price levels and the market’s effect on low-carbon consumers and investors. To a large extent it decides whether or not the ETS is able to work effectively as a production and investment policy tool.

China has already set an emissions reduction target of a 40–45% reduction in CO₂ emissions per unit of GDP by 2020 over 2005 levels and the

Figure 1. Predicted effects of an ETS on different sectors in the US



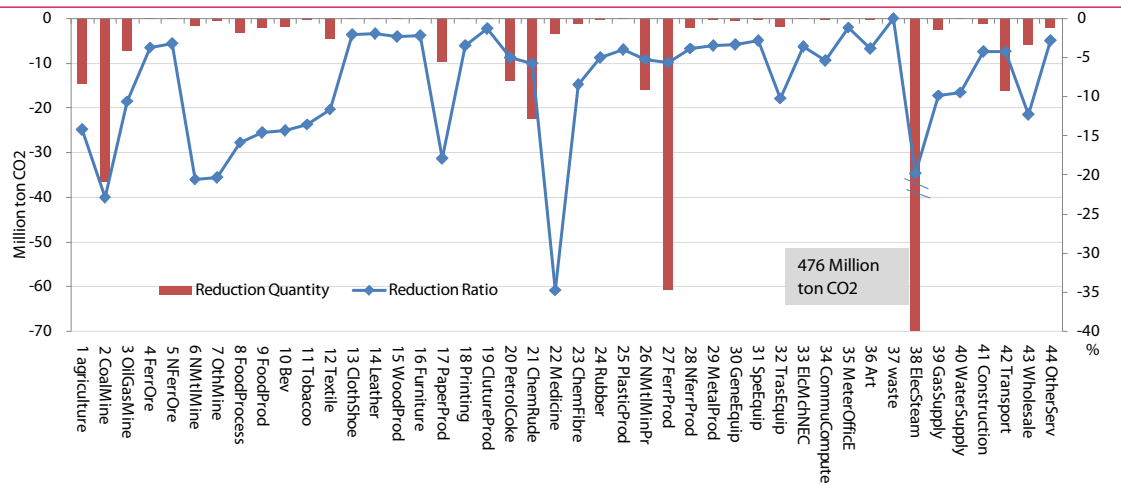
Source: EPA

the Twelfth Five-Year Plan (2011-2015) also sets a binding target of a 17% reduction in CO₂ emissions (carbon intensity) per unit of GDP. The ETS must act in conjunction with other policies to ensure the successful achievement of national and provincial emissions-reduction targets and its annual emission quotas before 2020; in both provincial ETS pilots and the nationwide system that will follow, emissions quotas should be determined based on the starting point of carbon intensity targets. Moreover, clarifying the role of the ETS with regards to overall emissions reductions is important given that such schemes should be adequately coordinated with other emission reduction policies.

To be more specific, the calculation of emissions quotas in an ETS according to intensity targets could be divided into three steps: the first step is to carry out economic development forecasts in certain regions according to a BAU (Business as Usual) design principle (Maxin et al., 2009) and to transform carbon intensity targets into carbon emissions targets in absolute value; the second step is to estimate the share of total emissions that would constitute emissions from sectors covered by the ETS in a given region over the previous period (such as 3 years); finally, an emission quota is calculated based on the results of the first two steps. This “coupling” process can be set up in a flexible manner based on the maturity of the carbon market and its impact on the competitiveness of liable companies. However, the process and its underlying rules must be fully transparent in order to be conducive to the stable development of a carbon emissions market.

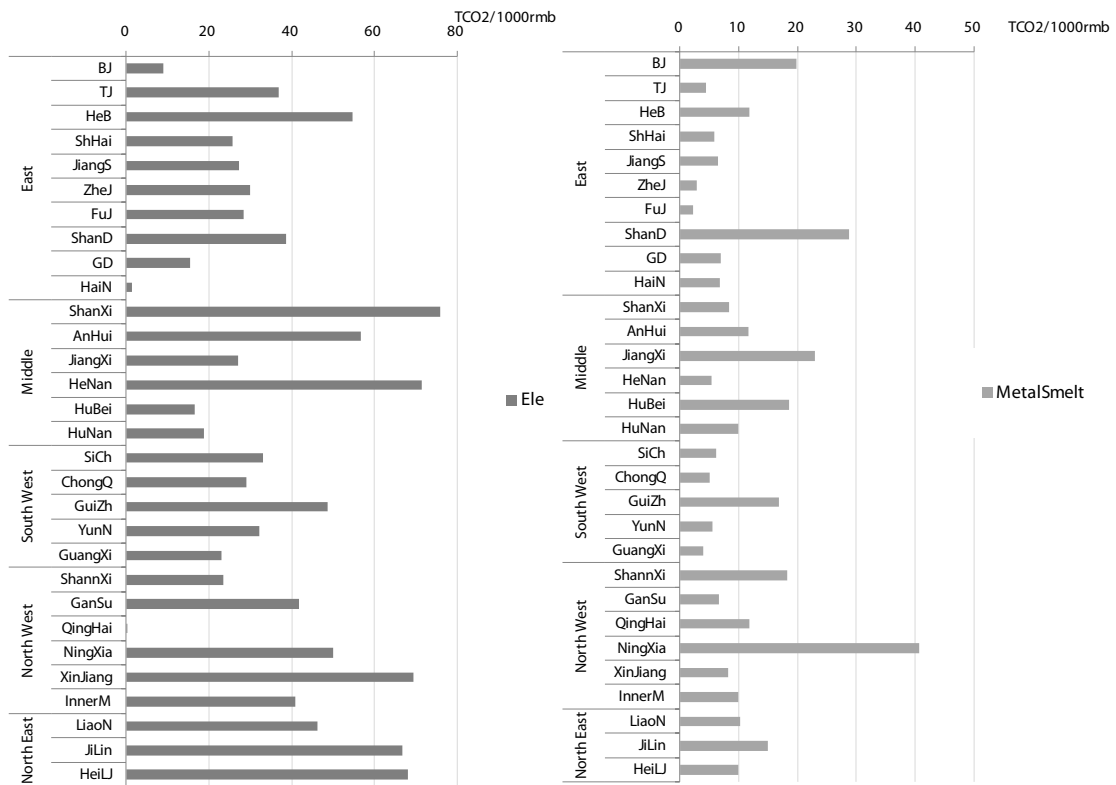
This kind of relative emissions-reduction approach is different from the methods used by existing scheme such as the EU ETS, where “future carbon market quotas are set according to absolute quantities of carbon emissions in the

Figure 2. Carbon emissions reductions brought about by a carbon price of 100 yuan (t/CO₂ by sector)



Note: revenues entailed by carbon pricing are used to ease general deficit, without any earmarking in this simulation. Source: SIC-GE.

Figure 3. A comparison of carbon intensity in key high energy consuming sectors across provinces¹



1. Note: This paper used input-output tables from 42 departments in 30 provinces in 2007 to calculate the unit increase in emissions per sector and chose to compare the following three high energy consuming sectors: power, metallurgy and the chemical industry. Source: SIC

past”, but it seems more suitable for the Chinese economic conditions. The period from now until 2020 is “a period of major strategic opportunities” for China’s future economic development. A good coordination between economic growth and GHG emissions mitigation is more important than only focusing on controlling GHG emissions.

Recommendation 4: Permit allocation choices: an organic combination of grandfathering and auctioning.

Two factors should be considered when determining the initial distribution of emissions permits: first, a buffer period is required for businesses to digest carbon costs and adapt to ETS conditions; second, as all industrial sectors are developing rapidly in China and the scale of new production capacity is enormous, the relationship between existing and new production capacities should be coordinated appropriately to avoid economic distortions.

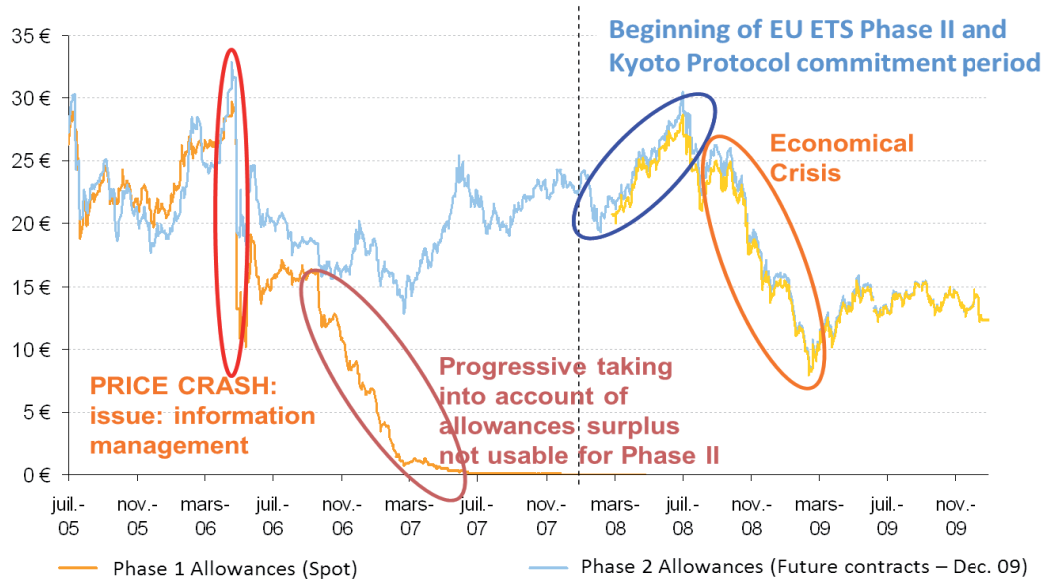
At present, two key methods of quotas allocation – grandfathering and auctioning – are used around the world. The vast majority of emissions trading systems in developed nations have used grandfather clauses based on historical emissions to distribute permits freely during initial start-up phases in order to minimise their impact on the competitiveness of businesses. However, this does not suit Chinese economic conditions. In the EU, the application of the grandfather clause encouraged new traders to use high-emitting technology in order to obtain more emissions quotas, which was inconsistent with the original intention of the ETS. This lesson is of particular importance to China considering that it is still in a stage of rapid development, with large increases in production capacity and many new businesses. Therefore, this paper recommends that emissions permits be allocated freely to existing production capacity units, after which quotas should be reduced in a slow and stable manner; while quotas should be auctioned to new production capacity units, in order to facilitate the use of low-carbon technologies. This kind of approach can lessen the short-term impact of the ETS on the competitiveness of existing businesses, while avoiding the use of technologies with high emissions intensity levels from new projects.

Recommendation 5: Initially, a carbon price floor should be set as a key supplementary measure for the ETS.

The success of an ETS in guiding low-carbon consumption and investment is dependent on whether or not carbon prices are set at a reasonable level, but by nature emissions trading systems imply carbon price fluctuations. Firstly, ETS differ from other

commodity markets in that emission caps for any year are determined in advance; so that any changes in demand are fully reflected in carbon price fluctuations. Also, other factors such as concerns regarding possible adverse effects of the ETS, overly optimistic economic forecasts and low estimations of the speed of technological progress often lead to exaggerated quota estimates. This can weaken the scarcity value of permits and cause carbon prices to fall or even collapse (Webster et al., 2008). During the initial phases of the EU ETS, the ETS in Norway and the RGGI in the US, carbon price crashes were largely due to high levels of quotas allocation. This is an important lesson to consider.

In addition to carrying out more research to increase the accuracy of quota calculations, supplementary measures are often needed to avoid large-scale price fluctuations and resolve the issue of carbon price instability. At present, the methods used by the EU to stabilise carbon prices include several kinds of flexible mechanisms, such as the Clean Development Mechanism (CDM) or the Joint Implementation (JI) that were established under the Kyoto Protocol; and flexible inter-period mechanisms in areas such as agreement durations, quota reserves and quota banking. In addition, there are also a number of simple and direct methods for setting upper and lower carbon price limits. The UK CRC market, the WCI in North America, and California ETS and the American Clean Energy and Security Act (H.R. 2454) all set floor carbon prices. Compared with other methods, such direct approaches to the determination of minimum carbon price levels have a higher impact on the market and can damage commercial efficiency in the short term. However, they can prevent excessively low carbon prices and stabilize expectations for investors and consumers in the future. Current Chinese economic conditions mean that design of a carbon offset mechanism is relatively difficult. But given the urgent need for a transformation of the approach to economic development in China, it is even more important to maintain an appropriate high carbon price level. Therefore, we recommend that during the initial start-up period of the ETS in China, we must first consider methods to set a minimum carbon price limit and integrate stock exchange market price limits in order to avoid excessive carbon-price fluctuations. (for example, stock exchanges in China have set 10% as the maximum price variation within a single trading day. Stock price is determined by the market demand and supply as long as its price variation lies within the range of -10% to +10%. However, the price of a stock is fixed artificially at +10% or -10% if it goes too high or too low and cannot overpass this threshold in a trading day.)

Figure 4. EU ETS quotas prices fluctuation

Source: BlueNext, ECX

Recommendation 6: Use laws and regulations to unify the scope and standards for carbon emissions measurements, reports and verification systems.

Credible emissions permits are the foundation of trade as “standard goods” in an ETS. Two aspects contribute to the credibility of carbon emissions accounting: first, a real correspondence between emissions permits distribution and the actual quantity of emissions; and second, the legal foundations. Therefore, we must establish a set of management systems for the measurement of emissions from emission sources, the submission of emissions reports to the government and the validation of the submitted reports (known as the MRV system). Emissions permits can only be based on emissions quantities that are authenticated by this system. **In order to facilitate the long-term development of the ETS, we recommend that actions must be taken at the national level and as soon as possible in order to establish the legal and regulatory measures which are necessary to establish the standards, guidelines and detailed regulations of an MRV system.** The reasons for this are threefold. First, although the ETS are currently being established in pilot locations, the ultimate target is to expand their coverage nationwide. The establishment of standardised MRV systems in pilot areas will benefit the future integration of the ETS across the country. Second, China is the world’s top producer of carbon emissions and its ETS promises to become the largest in the world. The establishment of a unified MRV system across the country and the creation of standardised emission permits

will benefit China’s future participation in global emission trading markets and give it greater international credibility. Third, the establishment of an MRV system requires a large amount of specialised labour and long-term training of personnel. The technical standards and detailed regulations that are involved in the establishment of a unified MRV system are conducive to a highly efficient training of personnel.

Recommendation 7: Progressive advancement and quality improvement of the MRV system

When China issues unified standards for the establishment of an MRV system, all regions in the country will gradually establish MRV systems in time with the construction of the ETS. But this will not be accomplished overnight – it should be a process of exploratory construction, progressive development and sustainable completion that is carried out in conjunction with the ETS. In the EU for example, the EU ETS established a series of MRV regulations before its initial implementation phase (2004/156/EC). During the first phase it went on to improve and expand regulations regarding the measurement and evaluation of emissions, and in 2007 formed a second set of MRV regulations (2007/589/EC). It is currently continuing to adjust regulations for the unified ETS that will be established in the EU in 2013.

Current statistics on carbon emissions in China are still relatively weak and are based on three key areas: first, the five-yearly formulation of national carbon emissions inventories; second, energy

source audits targeting large-scale enterprises; and third, research in emissions measurement methods from CDM projects. In the future, efforts to establish MRV systems in pilot areas in China should build on the lessons learnt in these three areas and gradually establish an MRV system under the unified direction of state regulations.

Recommendation 8: Use the construction of an emissions trading platform to promote the gradual development of a carbon finance industry.

Following the development of an ETS, a carbon finance industry will also gradually emerge. The definition of carbon finance industry can be very broad in scope and could include: the establishment of trading platforms dedicated to emissions trading; carbon securities companies creating derivatives based on emissions permits; and carbon fund companies specialised in carbon trading. The development of the carbon finance industry will allow financial markets to facilitate price discovery and lower trading costs, increase the flexibility of emissions permit trading and clarify the results of the ETS with regard to emissions reductions. In addition, it will also promote the emergence and development of new forms of industry that focus on servicing low-carbon production and consumption.

Given current conditions, we recommend using the construction of a carbon trading platform to spearhead the advancement of the carbon finance industry. In one respect, a carbon trading platform is fundamental to standardise the system of emissions permit trading and to regulate the operation of the carbon market. As such, it should be established in the initial start-up phase of the ETS. By contrast, the development of carbon securities companies and carbon fund companies should come later and should be developed only gradually after the ETS has been established and is operating normally. In addition, more or less all existing environmental exchanges in China participate in carbon trading and have accumulated a significant amount of experience for future domestic emissions trading.

Environmental exchanges in China are developing quickly in successive phases: in 2008 there were only three: the Shanghai Environment Energy Exchange, the Beijing Environment Exchange and the Tianjin Climate Exchange; in 2009 environmental exchanges had been established in a number of provinces, such as Zhejiang, Yunnan, Hubei and Guangdong; and in 2010 other provinces such as Shandong, Shanxi and Sichuan have also started

to plan for the development of similar trading platforms. Their work is still based primarily on CDM emissions trading and voluntary emissions trading. In the future, efforts must be made to prepare to adapt emissions permit trading, including training of specialised traders and the development of a carbon trading account system.

Recommendation 9: The ETS must be well coordinated with other energy-saving and emissions-reduction policies.

Although the establishment of an ETS is of great importance for the future of energy-saving and emissions-reduction efforts in China, it might not be the only policy needed. Both the pilot schemes that are being set up at present and the unified, nationwide ETS that will be established in the future must be well coordinated with other energy-saving and emissions-reduction policies. In one respect, the ETS can only cover a limited range of sectors and businesses. In order to cover a wider range of emission sources, other policies must also encourage emissions reductions. In addition, some other policies should be relaxed in order to prevent putting excessive pressure on companies during the initial start-up phase of the ETS and to encourage businesses to enter the market. Thirdly, the market operating mechanism of the ETS must be carefully protected as it progressively develops and as more regulatory details emerge.

Recommendation 10: Launch training for specialised ETS personnel as soon as possible.

One of the key elements of the establishment of an ETS is the training of specialised personnel. However, ETS specialists are extremely rare in China, which is due to two reasons: first, emissions trading is a newly emerging sector and still lacks a body of theory and knowledge; second, specialised personnel in the emissions trading sector must have inter-disciplinary knowledge in all disciplines involved, such as the environment, finance, law and management.

Therefore, the training of specialised ETS staff must begin in the following three areas: first, theoretical and knowledge systems related to emissions trading must be developed in order to provide the foundation for training backgrounds; second, professional training schools and training organisations should be established to train specialised ETS staff; third, qualifications for ETS personnel should be strengthened to enable the ETS to operate in a normal and orderly way. ■