We find that China has embarked on a sincere and ambitious attempt to develop a domestic carbon trading system, but that the plans to have a functional national system in place by 2015 are extremely bold and face considerable difficulties. Some would arise in any country, but the shortcomings of China’s current market system also raise particular questions about the viability of market-based instruments there.

Experiments and pilot tests

Contrary to what news reports might suggest, carbon trading in China is still in its infancy, with much experimentation but few results to date. By any real measure, there is no functional carbon market in China, aside from activities related to the Clean Development Mechanism (CDM). China certainly does not have a regulated carbon market yet, and experiments with voluntary markets are limited, with only a handful of deals

Planning for energy security

In the early 2000s, it became obvious that the supercharged growth of the Chinese economy had reached a level at which keeping up with energy demand would increasingly pose serious challenges. Realising that energy, climate change mitigation, and economic development are tightly interlinked, the Chinese government developed an ambitious set of energy-security and climate-related policies as a cornerstone of the 11th Five-Year Plan (2006-2010).

The plan aimed to reduce energy intensity by 20 per cent and increase the share of renewables in the energy mix from 6 to almost 10 per cent by 2010. It was implemented through strict top-down command and control measures, which fit well with the Chinese administrative system, but came at a higher cost than alternative financial or market-based measures.

Recognising the limited efficacy of top-down measures and the difficulties in sustaining their effects, China is now looking at market-based instruments such as environmental/carbon taxation and emission trading as potential new tools to further reduce the energy- and carbon intensity of its economy.

This is the context in which, in its 12th Five-Year Plan (2011-2015), the Chinese government announced its intent to establish a national carbon trading system by 2015. As a first step, the National Development and Reform Commission (NDRC) has initiated carbon trading pilots in seven provinces and cities.

This policy brief, based on a report published by SEI and FORES, evaluates the progress so far and examines the key challenges ahead. It is based on a review and synthesis of the research literature, news reports, and Chinese government documents, complemented by selected interviews.
— mostly symbolic — done since the Beijing and Tianjin exchanges were founded in 2008, for example. Yet the growing consensus is that, sooner or later, carbon markets are coming to China.

The country’s most significant step so far toward a full-fledged carbon trading system is the establishment of regional pilots under the 12th FYP. The NDRC announced the pilot sites in November 2011: the cities of Beijing, Shanghai, Tianjing, Chongqin, Shenzhen, and Guangdong and Hubei provinces.

The pilot sites, shown in Figure 1, were selected to reflect the regional diversity in terms of development. All but Beijing and Shanghai are also part of the low-carbon development pilots initiated in August 2010. As part of the pilots, they must submit proposals explaining how carbon emission targets will be allocated, establish a dedicated fund to support the carbon trade market, and present detailed implementation plans to the State Council by the end of 2012. The goal is to have pilot carbon trading at a regional level by 2014 and at a national level by 2016. During the pilot phase, local governments can decide upon the means of capping and select capped sectors themselves.

In addition to the seven regional carbon-trading pilots, China is also preparing for experimentation with sector-based carbon trading market development. One prime candidate is the power sector, which relies heavily on coal and is thus a major source of emissions. The sector has already piloted several important projects, but it is unclear how well carbon pricing would work given that electricity prices are controlled by the central government. Some Chinese power generators are already operating at a loss, due to rises in energy commodity prices without corresponding increases to the electricity price.

Another candidate is the Chinese building sector, which consumes more than 650 million tonnes of coal-equivalent annually — more than Germany’s total primary energy consumption. Two billion square meters of new buildings are built in China every year, and 80 per cent of existing buildings are classified as “non-energy efficient”. The government has previously sought to curb energy consumption through mandatory efficiency standards and subsidies, among other measures. Now it is exploring options for carbon trading for the sector, such as a cap-and-trade system for large non-residential buildings, or for heating suppliers.

Clearly, China is moving into an intensive phase of testing carbon trading, and we believe the success or failure of those experiments will, to a large extent, determine the future of carbon markets development.

The CDM: trading as it’s known today

The CDM, established under the Kyoto Protocol, is an offset market in which investors from developed countries obtain “carbon credits” by implementing a project in a developing country that reduces emissions relative to an agreed and verified baseline. China has been the top CDM carbon credit supplier, with 1,560 projects successfully registered with the CDM Executive Board, 45.7 per cent of world total, and 328 million tonnes of carbon dioxide-equivalent (CO₂e) in certified emission reductions, or 63.8 per cent of the global total, according to China’s State Council Information Office.

While the CDM has been a positive introduction to carbon trading, however, it caters almost exclusively to foreign buyers. Unlike domestic carbon markets, it does not encourage competition within sectors or between regions in China to cost-effectively reduce carbon intensity and increase energy efficiency. The overall emission reductions are also small compared with China’s needs. Total emission reductions under
the CDM, worldwide, from its inception to 2012, have been estimated at 1 billion tonnes of CO2, but China’s emissions in 2010 reached 8.95 billion tonnes.

Third, uncertainty over the future of the CDM, which is tied to the soon-to-expire Kyoto Protocol, is an increasing concern and consequent driver for China to develop its own stand-alone domestic trading system, while at the same time staking out its position in a global trading system. Many in China argue that, in the long run, China can sell carbon offsets more profitably than it does under the CDM. Table 1 summarises key developments in China’s experience with the CDM and with carbon trading.

**Baseline data and emission targets**

China’s experience with other types of environmental pollution emission trading – starting in the late 1980s, and involving pollutants such as sulphur oxides – has generally been negative, with multiple pilot programmes that yielded few results.

Research on these prior efforts suggests that China needs to start by measuring emissions more accurately, and it also needs to establish a better legal infrastructure, with clearly defined emission rights, permit allocation systems, trading rules, monitoring, and enforcement and accountability. There is also a need for capacity-building at the administrative level.

Setting emission caps – an essential departure point for any emission trading scheme – and allocating permits equitably could be challenging for China, given the wide differences in economic structure, growth rates, energy consumption and carbon intensities across provinces. There is also a lack of reliable carbon emission data, which makes it hard to set a realistic target, given uncertainties about baselines.

The Chinese government said in October 2010 that it was building an updated national greenhouse emission database, the first publicly available database to include provincial level data since 1994. This is a positive step, and China’s general stance toward measurement, reporting and verification (MRV) has also become more positive. However, China still lacks essential legislation and enough third-party verification companies to support domestic carbon trading.

China also needs to decide whether it should adopt an absolute emissions cap, or an intensity-based one. An absolute carbon cap would make emission reductions predictable, but a carbon intensity cap would be less controversial within China, because it would not conflict with continued rapid GDP growth. Whatever the outcome, it is likely that China’s system will allow for emissions to keep rising – just less than would be expected without a carbon market. There are also proposals to include a nationwide “energy cap” and trade quotas based on energy consumption.

**Integration challenges**

While China experiments with carbon markets under the 12th FYP, it is highly probable that it will also initiate environmental/carbon taxation, either for pilot testing or to be adopted nationally, though it is still unclear how taxes will be integrated with the carbon trading market. Some of the pilots may follow the example of Australia, where a carbon tax is being introduced this year, but in the long term, tradable permits will replace it.

The prospects for eventual integration of the Chinese carbon trading market with international trading schemes also remain unclear, though it is helpful that the pilots are studying and testing various models from other countries. Domestically, meanwhile, much work remains to be done to determine how regional and sector-based trading schemes might be integrated.

**Table 1: Summary of major developments in carbon trading in China**

<table>
<thead>
<tr>
<th>Year</th>
<th>Major development</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>After initial hesitation, China endorses the implementation of CDM in China. The National Development and Reform Commission (NDRC) issues a white paper with CDM guidelines.</td>
</tr>
<tr>
<td>2005</td>
<td>In October 2005, carbon trading under the CDM begins in China, administered at the national level by the NDRC. China starts to implement the 11th FYP, which sets a 20 per cent energy intensity reduction target, to be attained primarily through command-and-control measures.</td>
</tr>
<tr>
<td>2007</td>
<td>The NDRC issues China’s first National Climate Change Programme, laying out policies and actions to cope with climate change. Carbon markets are not highlighted.</td>
</tr>
<tr>
<td>2008</td>
<td>Establishment of several environment and carbon exchanges, including the Tianjin Climate Exchange, China Beijing Environment Exchange, and Shanghai Environment and Energy Exchanges.</td>
</tr>
<tr>
<td>2010</td>
<td>August: NDRC, initiates low-carbon development pilots in five provinces and eight cities. Carbon trading is encouraged as part of the overall development strategy. November: The outline of the 12th FYP is published, listing carbon markets as one of the key measures for reducing carbon and energy intensities and coping with climate change.</td>
</tr>
<tr>
<td>2012-13</td>
<td>Design phase of regional pilots.</td>
</tr>
<tr>
<td>2014</td>
<td>Pilot region carbon trading to be operational.</td>
</tr>
<tr>
<td>2016</td>
<td>National carbon emission trading system to be established in China.</td>
</tr>
</tbody>
</table>

Sources: Compiled by authors from multiple Chinese government documents and news reports.
Policy considerations

- Though China is new to carbon trading, it can draw lessons from past experiments with other kinds of pollution emission trading, such as with sulphur dioxide, which had problems with emission measurement, permit allocation, enforcement, and administrative capacity. We believe similar issues could arise with carbon markets.

- Setting an emission cap and allocating emission permits equitably and efficiently is crucial, but for China, this may not be easy, because of large differences in economic structures, growth rates, energy consumption and carbon emissions across Chinese provinces. Any approach chosen may worsen regional disparities.

- There is no consensus in China on whether an emission cap should be absolute or intensity-based. While the latter would be less controversial within China, its impact on total emissions would be unpredictable, since emissions would be closely linked with the speed of the economic growth.

- China still needs to determine whether to initiate environmental/carbon taxation during the 12th FYP, and if so, how to link it with the carbon trading market. Also in this period, China is likely to implement measures – administrative and market-based – to adjust its industrial structure, energy structure, and to improve energy conservation and use efficiency, as well as increasing forest coverage.

- The integration of regional as well as sector-based trading schemes also needs to be sorted out, and detailed regulations will be needed to ensure the interchangeability of carbon credits from the different regions and sectors, uniformity of standards and consistency in monitoring and verification.

- International support and advice will be critical. China lacks the technical knowledge, corporate culture, and market expertise to needed to build successful carbon markets. Changing the behaviour of financiers and the industrial workforce could take years, and lessons learned from the CDM might be only loosely transferrable. China will also need to extensive capacity-building, not only to ensure it has qualified staff to manage and to oversee the markets, but also to prepare the participating industries.