Technical Assistance Consultant’s Report

Project Number: 44043-012
December 2014

People’s Republic of China: Study on Beijing Green Finance Development Strategy
(Financed by the ADB’s Technical Assistance Special Fund)

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For Beijing Municipal Bureau of Financial (Executing Agency)
China Beijing Environment Exchange (Implementing Agency)

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Asian Development Bank
Study on Beijing Green Finance Development Strategy

Final Report

December 2013

SinoCarbon Innovation & Investment Co., Ltd
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<th>Description</th>
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<tbody>
<tr>
<td>CBEEX</td>
<td>China Beijing Environment Exchange</td>
</tr>
<tr>
<td>CBRC</td>
<td>China Bank Regulatory Commission</td>
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<tr>
<td>CCER</td>
<td>China Certified Emission Reduction Credit</td>
</tr>
<tr>
<td>CDM</td>
<td>Clean Development Mechanism</td>
</tr>
<tr>
<td>CER</td>
<td>Certified Emission Reductions</td>
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<tr>
<td>CIRC</td>
<td>China Insurance Regulatory Commission</td>
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<tr>
<td>CSRC</td>
<td>China Securities Regulatory Commission</td>
</tr>
<tr>
<td>ERU</td>
<td>Emission Reduction Unit</td>
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<tr>
<td>ETS</td>
<td>Emission Trading Scheme</td>
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<tr>
<td>EU ETS</td>
<td>European Union Emissions Trading Scheme</td>
</tr>
<tr>
<td>EUA</td>
<td>European Union Allowance</td>
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<tr>
<td>FYP</td>
<td>Five Year Plan</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>MRV</td>
<td>Monitoring, Reporting and Verification</td>
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<tr>
<td>NCTC</td>
<td>National Carbon Trading Center</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>NDRC</td>
<td>National Development and Reform Commission</td>
</tr>
<tr>
<td>OTC</td>
<td>Over the Counter</td>
</tr>
<tr>
<td>PMR</td>
<td>Partnership for Market Readiness</td>
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<tr>
<td>UK ETS</td>
<td>United Kingdom’s Emission Trading Scheme</td>
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<td>UN</td>
<td>United Nations</td>
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Part I Understanding the Project

1. Project background

1.1. International Climate Process

Since the 1980s, the issue of climate change had been increasingly catching the attention of the international community. Due to massive consumption of fossil fuels since the industrial revolution, CO$_2$ concentrate in the globe atmosphere has been increasing rapidly, causing greenhouse effect and climate change featured by temperature rising of the earth surface. Climate change could lead to daunting environmental and socioeconomic challenges to the human society. The international community responded accordingly by launching a process under the auspices of the United Nations.

In 1988, the World Meteorology Organization (WMO) and the United Nations Environment Programme (UNEP) jointly established the Intergovernmental Panel on Climate Change (IPCC). IPCC delivered four Assessment Reports on climate change in 1990, 1995, 2001 and 2007 respectively, which laid scientific foundation for international response, especially the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, and the ongoing UN negotiations process.

The latest 5$^{th}$ Assessment Report of IPCC is anticipated to be finished in 2014, and it would bring new momentum to the current negotiations on the post 2020 international agreement under the Durban Platform. In December 2011, the UN Climate Change Conference was held in Durban, South Africa, and the Parties to UNFCCC adopted a milestone decision to launch a new negotiations process called “Durban Platform” for a post 2020 international agreement applicable to all Parties. The post 2020 agreement is scheduled to be adopted in 2015 at the UN Climate Change Conference to be held...
in Paris.

1.2. Overview of carbon market and carbon finance

Since the adoption of the Kyoto Protocol in 1997 under UNFCCC, the concept of market based measures was formally recognized by the international community. The Kyoto Protocol endorsed three flexible mechanisms, namely Emission Trading, Clean Development Mechanism (CDM) and Joint Implementation (JI). Emission trading allows industrialized countries which undertake quantified emission reduction commitment under the Kyoto Protocol to trade emission units among themselves. Under CDM, industrialized countries could cooperate with developing countries by financing emission reduction projects in exchange of Certified Emission Reductions (CERs). Under JI, industrialized countries could cooperate with countries undergoing economic transition by financing emission reduction projects in exchange of Emission Reduction Units (ERUs). CERs and ERUs are Kyoto Units industrialized countries could be used to fulfill their compliance obligations under the Kyoto Protocol. Parties had developed a series of procedures, modalities, technical guidelines and methodologies for the implementation of the flexible mechanism. Since 2005, with the entry into force of the Kyoto Protocol, the implementation of three flexible mechanisms created the first international carbon market.

The Kyoto Protocol also played a catalytic role for the adoption of domestic emission trading system. Officially launched in 2005, the European Emission Trading Scheme (EU ETS) is the first domestic comprehensive and compulsory carbon trading mechanism. EU ETS is designed to be the flagship instrument of the European Union’s climate change policy, and also important tool for the EU to achieve its Kyoto targets. By launching EU ETS, Europe set the example to the world, and other countries and sub-national regions followed.

In 2011, the Australia parliament passed a land marking climate package which decided to introduce a Carbon Pricing Mechanism (CPM) in the country. The CPM
starts from July 2012 as fixed price mechanism with a clear time table to transit to a full emission trading market from July 2015 onwards. In 2013, the State of California, US, launched a carbon trading scheme. In 2012, South Korea also passed a legislation aiming to formally launch a domestic carbon trading mechanism on January 1 2015.

In late 2010, the World Bank launched the Partnership for Market Readiness (PMR). The objective of PMR is to facilitate the making of a new generation of international carbon market. It encourages and supports developing countries to develop their own market based mechanisms as new policy instruments to help them reduce GHG emissions. By providing financial resources and establishing knowledge and experiences sharing platform, PMR is currently supporting 16 developing countries in preparing their own national market based measures.

As the vigorous establishment of carbon trading schemes globally, the carbon finance industry develops as well. Essentially, carbon finance is developed to serve the carbon market. The diversity of the participants and types of transactions contribute to the complexity of carbon finance. London is one typical example where carbon finance is well developed.

1.3. PRC’s efforts in establishing carbon market

International expectation on PRC to play a more critical role and to take part in the future international climate regime is high. Chastened by the progress of international negotiations and other regional and national low carbon development trend, and the emerging of carbon markets in various economies, PRC has adopted low carbon transformation as a national strategy. In recent years, PRC has announced a flurry of policies and measures to promote low-carbon development. In 2009, the Chinese government announced a national target to reduce its carbon emissions per unit of GDP by 40 to 45 percent compared to 2005 level by 2020. During its 12th Five Year Plan (FYP), this 2020 target is translated into a 2015 target of cutting CO₂ emissions per unit of GDP by 17%. In order to achieve these goals, the Chinese government
decides to gradually build up a national emission trading system. In November 2011, National Development and Reform Commission (NDRC) issued the Work Plan for Controlling Greenhouse Gas Emissions during the 12th Five-Year Plan Period, which reiterates the significance of creating a carbon market in PRC.

Currently, PRC is undergoing a transitional phase towards building a full-fledge national unified carbon market, hopefully during the 13th Five-Year plan period. The main task for the 12th FYP period is the pilot work. NDRC hope to testing and capturing early lessons and experiences in designing and implementation of emission trading in pilot areas, while at the same time preparing at the national level for the national unified carbon market. On October 29, 2011, The General Office of NDRC released the Notice on Carrying out Pilot Programs of Emission Trading Scheme, approving the 7 pilot cities and provinces (respectively Beijing, Tianjin, Shanghai, Chongqing, Shenzhen, Hubei and Guangdong) for emission trading pilots. Shenzhen officially kicked operation and trading in June 18 2013, and Shanghai, Beijing and Guangdong are also likely to official launch their pilot carbon market in 2013.

Offsetting mechanism is an integral part to carbon market building in PRC, and currently, NRDC is advancing this preparatory work smoothly on the national level. In PRC, the potential national offsetting mechanism is named voluntary emission reduction trading. On June 13, 2012, NDRC promulgated the Interim Regulation of Voluntary Greenhouse Gases Emission Trading in PRC. This Interim Regulation identified the managing rules for project based voluntary emission reduction trading activities.

1.4. Necessity of establishing carbon finance center

The international community is undergoing a far-reaching revolutionary transition to a low carbon future, and countries are formulating and implementing policies and measures to achieve this ambition. However, the transition from the traditional development path to a more sustainable low carbon economy faces tremendous
challenges. Financing low carbon development is a key area that governments are keen to address. Carbon finance could become a new supportive means to boost low carbon economy and it offers tremendous business opportunities. Combining the innovation in the financial system and the carbon emission trading, the carbon finance market can provide new financing channels for the development of low carbon economy and clean energy, boosting economic growth and creating new jobs.

By establishing carbon finance center, the said functions of carbon finance can be given into play in a more centralized manner. Some cities, which have strong competitiveness in providing traditional finance services, have further expanded their advantages to become an international carbon finance center by combining and integrating the newly emerging carbon finance service with their traditional financial business. It would become a historic opportunity for PRC to harness the opportunity of carbon trading to develop its own carbon finance center. For Beijing, since it has a well-developed finance foundation in PRC and has been chosen as one of the seven pilot schemes, it also possesses the potential to grasp this looming opportunity.

2. Project objective

The purpose of the technical assistance (TA) is to help the PRC achieve its emission reduction target through the development of a carbon finance center. For that purpose, the TA conducted a study on the status of carbon finance in the PRC, and made policy recommendations and road map for establishment of a carbon finance center in Beijing, the PRC.

3. Project implementing procedure

3.1 Project scope and outputs

Based on the project objective, the project scope covered three major research tasks.

1. Review the development of international and national carbon markets, identify key
factors in the development of carbon market, and inform relevant government departments and major stakeholders on the basic theory and structure of carbon market. This study is expected to lay a theoretical foundation for the feasibility study of developing Beijing into a carbon finance center.

**Output 1: a report on Key Factors in the Development of Carbon Market.**

2. Feasibility study on the development of carbon finance in PRC, focusing on a comprehensive and in-depth analysis on its prerequisite, conditions, opportunities and challenges. The purpose of this study is to help government departments and major stakeholders to understand comprehensively and more precisely the status quo and prospect for PRC to develop and boost carbon finance.

**Output 2: a report on Feasibility Study on Establishing Carbon Finance Center in PRC**

3. Based on the previous studies, the basic indicators of a carbon finance center are introduced by studying London as typical case. Based on the indicators, we identified strength and weakness of Beijing to development carbon finance, and propose a roadmap for Beijing to develop into a carbon finance center. The roadmap set three staged targets for Beijing, and offer corresponding policy recommendations surrounding these targets.

**Output 3: a report on Policy Recommendations for Developing Beijing into a Carbon Finance Center**

**Output 4: Series of seminars and workshops**

The project conducted a series of seminars and workshops aiming to seek opinions and comments from government officials, representatives from financial institutions and other major stakeholders.

- February 2012: Inception meeting
- June 2012: The first workshop was held to identify key factors of carbon market. Project experts participated in this workshop and discussed the regulatory framework, infrastructure and supervisory system of carbon market, and identified main participants and relevant stakeholders in the carbon market.

- November and December 2012: The second and third workshops were held to seek experts’ comments on the feasibility study report and key factor report.

- April 2013: A seminar on policy recommendations for developing Beijing into a carbon finance center was held to discuss the draft roadmap of Beijing’s carbon finance development and policy recommendation report among experts and industry representatives.

- July 2013: Interim workshop was held to review the status of Beijing’s carbon trading pilot, study the overall progress of the project implementation and gather experts’ comments on the draft policy recommendation. More than fifty experts and industry representatives were participated in this workshop.

- September 2013: A key stakeholder’s workshop was held to introduce and share the roadmap of building Beijing into a carbon finance center and its staged objectives, introduce and review the overall outcome of the project, and stimulate discussion and knowledge sharing among relevant stakeholders.

- December 2013: Final workshop was held to disseminate the project outputs to the government, financial institutions, and other stakeholders.

Based on the series of seminars and workshops, a Summary of Stakeholder’s Comment, summarizing and analyzing comments from relevant stakeholders, is produced.

Output 5: Final report

The final report covers the project background, key findings, policy recommendations and a road map, and the three reports.
3.2 Project structure

Figure 1 Project structure
3.3 Implementation Timeline

Figure 2 Project Implementation Timeline
4. Structure of project findings

As shown in Figure 3, the structure of this project is to carried out the project step by step, from the macro level to micro level. The first report, namely key factors in the development of carbon market, laid a theoretical foundation for the whole project. In this report, the birth and its current status of international carbon market is analyzed and summarized. Since international carbon market is the model for PRC’s domestic carbon market, the study and knowledge sharing of international carbon market experience is necessary. Then the main existing regional and national carbon market are introduced, including carbon markets in the European Union, New Zealand, Australia, California and South Korea respectively. Based on this analysis, some common features and key elements of are identified and summarized, which includes laws and policies, infrastructure (emission reporting system, registry system and trading system), supervision mechanism, market participants, carbon financial instruments and products. These key elements are regarded as the foundations and
main tasks in building carbon market, which is the pre-condition for establishing carbon finance center.

Based on the outcome of the first report, the second report, Feasibility Study on Establishing Carbon Finance Center in PRC, assesses, the feasibility of building carbon finance center in PRC, especially in Beijing. First, the foundations and current status of PRC’s carbon market had been examined. And the development of carbon finance industry in PRC had also been reviewed in terms of PRC’s green finance policy and the actions of domestic financial institutions. Then the opportunity and challenges of carbon finance development in PRC is analyzed. Necessity and feasibility of establishing carbon finance center in PRC has been proved as well. After that, the study further introduced the current development status of PRC Beijing Environment Exchange (CBEEX). As the only environment exchange of Beijing pilot and the active constructor of Beijing carbon market, CBEEX holds the stick in developing Beijing into a carbon finance center.

In the third report, our attention went further to the Beijing local level, focusing on the establishment of carbon finance center there and providing relevant recommendations for policy makers and major stakeholders. The objective of this report is to provide policy recommendations for developing Beijing into a carbon finance center. Based on the foundations laid out by the previous two reports, and the further analysis of PRC and Beijing’s special circumstances, we set out a target for Beijing to establish a carbon finance center. The experiences and lessons of London in developing into an international carbon finance center have been studied. By capturing some key indicators from London, we made a comparison between London and Beijing, and differences between Beijing and London had been sought out. In a nutshell, Beijing has potential to develop into carbon finance center, although it is still faced with a number of challenges. In the long run, Beijing has tremendous opportunities and enough space to develop carbon finance. However, building Beijing into a carbon finance center cannot happen overnight, it should be a long term and gradual process. Therefore, the road map for developing Beijing into a carbon finance center is divided
into three key stages: (i) build a national carbon trading platform in Beijing, (ii) build Beijing into a national carbon finance center, and (iii) an international carbon finance center. Accordingly, respective policy recommendations are proposed for these three stages.

5. Key Findings

In line with the global trend of low carbon development, and with carbon trading being widely adopted by more and more countries and sub-national regions, PRC is also proactively establishing its own carbon trading pilot schemes and the national unified carbon trading market.

Beijing, as the capital city and one of the seven pilots, holds great potential in developing into PRC’s carbon trading center, and then carbon finance center. Being PRC’s capital city, Beijing gathers all national government departments, financial regulatory departments and headquarters of major domestic financial institutions. However, to be the national carbon finance center, Beijing still has two main challenges:

✧ Beijing is still struggling to become the national carbon trading center;
✧ Beijing financial industry is not fully developed and financial market is not mature enough to sustain a carbon finance center.

In consideration of the pros and cons of Beijing in developing into a carbon finance center, we propose a staged road map for Beijing, and respective policy recommendations.

○ Stage One: Building a national carbon trading center.

Beijing’s target in this stage is to build and improve its carbon trading pilot step by step, with the key task of establishing a national carbon exchange in Beijing. During this stage, Beijing shall strive for the successful implantation of its pilot ETS. For the successful implementation, key is to improve carbon market
infrastructure by strengthening (i) registry system, (ii) emission report system and (iii) trading system, and developing price monitoring and containment mechanism. The other key for Beijing is to enhance development of project-based voluntary carbon trading.

- **Stage Two: Building a national carbon finance center**

  Beijing shall build into the national carbon finance center by building carbon derivative trading and promoting voluntary emission reduction trading. Key at this stage will (i) apply and acquire the national license to conduct carbon derivative trading, (ii) improve technical capacity to enhance the carbon derivative trading, and (iii) promote voluntary emission reduction projects by boosting low-carbon loans.

  **Stage Three: Building into an international carbon finance center**

  To build Beijing into an international carbon finance center is based on the successful implementation of the previous two objectives in stage one and two. Beijing needs take a long term strategy, and continuously improve its financial industry basis, especially the carbon finance infrastructures.

**Part II Contents of Research Results**

**Chapter 1. The status of International Carbon Market**

**1.1 The origin of carbon market**

Carbon trading, also known as “carbon emission trading” or “greenhouse gas emissions trading”, is first created by two milestone international agreements, namely The United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol (KP).
The UNFCCC was given birth by the United Nations Conference on Environment and Development (UNCED) in 1992. The ultimate objective of this Convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Both the developed country Parties and developing country Parties shall take common but differentiated responsibilities. Accordingly, the developed country Parties should take the lead in reducing global greenhouse gas emission to 1990 levels by the year of 2000.

The Kyoto Protocol was adopted at the third session of the Conference of Parties to the UNFCCC in 1997 in Kyoto, Japan. It is the first legally binding protocol that sets quantified commitments to reduce greenhouse gases. Under the Protocol, Annex I countries (Developed Nations and Nations with Economies in Transition) shall reduce their overall emissions of six greenhouse gases by at least 5 percent below 1990 levels in the first commitment period from 2008 to 2012. The Protocol aims to protect environment by controlling greenhouse gas concentration in the atmosphere through close international cooperation.

Kyoto Protocol provides Quantified Emission Reduction and Limitation Objectives (QERLOs) for developed countries that are obligated to reduce their emissions by 5% in aggregate compared to 1990 levels in the first commitment period (2008-2012). Annex B to Protocol also inscribes quantified emission limitations or reduction commitment for developed country Parties. Accordingly, carbon emission become a rare resource globally, making it possible for pricing, trading and eventually creating a carbon trading market dominated by carbon dioxide emissions.

Developed country Parties can meet commitments by taking domestic reduction actions. They may also use the Flexible Mechanisms under the Protocol, namely Emissions Trading (ET), Joint Implementation (JI) and Clean Development Mechanism (CDM). The KP also allocates the Assigned Amount of Units (AAUs) to each developed countries according to their QERLOs inscribed in Annex B. In principle, the actual Greenhouse Gas (GHG) emissions of a certain developed country
shall not exceed its assigned AAUs in the first commitment period, but credits from flexibility mechanisms are allowed for compliance purposes. (see the following table for the Flexible Mechanism)

Table 1 the Three Market-based Flexible Mechanisms

<table>
<thead>
<tr>
<th>Type</th>
<th>Participants</th>
<th>Trading units</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions Trading (ET)</td>
<td>Annex I countries</td>
<td>Assigned amount units (AAUs)</td>
<td>Allowance trading</td>
</tr>
<tr>
<td></td>
<td>Developed Countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint Implementation (JI)</td>
<td>Annex I countries</td>
<td>emission reduction units (ERUs)</td>
<td>Project development</td>
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<tr>
<td></td>
<td>Developed Countries and Nations with Economies in Transition</td>
<td></td>
<td>and cooperation</td>
</tr>
<tr>
<td>Clean Development Mechanism (CDM)</td>
<td>Developed Countries and developing nations</td>
<td>certified emission reductions (CERs)</td>
<td>Project development</td>
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<td></td>
<td></td>
<td></td>
<td>and cooperation</td>
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1.2 Global Carbon Market Landscape

The global carbon trading markets have developed rapidly. World Bank reported that the global carbon market valued only $11 billion in 2005 and surged by 13 times to $143.7 billion in 2009, and the volume of transactions in 2008 alone more than doubled over the previous year. The Market value decreased slightly to $141.9 billion in 2010 caused by the uncertainty of Kyoto Protocol’s future and the financial recession. Meanwhile, the 2011 Durban conference sent a positive signal to the market, driving trading volume up again; although market policies were still vague and insufficient and carbon price plummeted. As a whole, the global market saw a

raise in overall value. As the World Bank report State and Trends of the Carbon Market 2012 shows, the total market value registered at $176 billion in 2011.

Figure 4 the Value and Trends of Global Carbon Market

1.3 Carbon Markets in Major Economies

European Union Emission Trading Scheme (EU ETS)

With an active advocate to tackle climate change, the EU has adopted several measures to reduce GHG emissions, in order to ensure that its member states could fulfill their emission reduction goals in the Kyoto Protocol. Among all these measures, the EU ETS is the basis.

EU ETS is not only the largest and most successful emission trading so far around the globe, but also the only multi-national emission trading scheme in operation. Launched on 1January 2005 as a typical cap-and-trade system, the EU ETS helps EU member states to restrict or reduce GHG emission as committed in an economical and effective way, thus allowing Europe to take a lead in curbing climate change.

Transactions in EU ETS has been accounting for a large proportion in the global carbon market. In 2009, the trading value of EU ETS totaled $118.5 billion equal to 82.4% of the global carbon market. In 2010, this number went up to $119.8 billion, and the market share rose to 84%. If the trading in the secondary CDM market was included, the EU ETS took up 97% of the total. In 2011, the trading of EU ETS, with
a value of $171 billion, accounted for over 97% of the global carbon market\(^2\).

![Figure 5 Proportions of EU ETS in the Global Carbon Market in Years\(^3\)](image)

The EU as a whole aims to reduce 20% of emission in 2020 and 60% to 80% in 2050 respectively, compared with that of 1990.

The EU ETS is implemented in three phases, and details of the scheme coverage, emission goals and system design in each phase are different. The first phase, as an experimental one from 2005 to 2007, aimed to accumulate experience for the following stages. In early June 2003, EU passed the 2003/87/EC Directive to formulate an emission trading scheme and set cap of industrial GHG emission. Against this background, the EU ETS set up as the first mandatory multi-national carbon emission trading mechanism. Covering 12,000 emission installations in industries such as energy, steel, cement, glass ceramics, and paper pulp, with a 45% of the EU GHG emission, it has become a key means for the EU to realize its emission reduction goals. The member states determine their own emissions cap for the installations under control. In the second phase, from 2008 to 2012, is a key period for EU to fulfill its commitment of emission reduction comprehensively. Besides the 27 EU member states, Iceland, Norway and Liechtenstein joined EU ETS. It also expands its coverage to industrial facilities with emission as much as nearly one half of the total EU CO\(_2\) emission and 40% of the total EU GHG emission. This phase is

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more stringent than before, EU Commission lowers 10.4% of the emission cap in the National Allocation Plans (NAPs) of all the member states and raises the fine for excessive emission from 40 Euro/t CO\(_2\) to 100 Euro/t CO\(_2\). These new features of second phase reflect the intention of EU to improve its mechanism step by step. For instance, the method of allocation has been readjusted: in the second phase, the power industry will not get all the allowance for free; the cap for EUA to be auctioned is up from 5% to 10%. The third phase is from 2013 to 2020. In December 2008, EU passed the legal document of 2009/29/EC to strengthen EU ETS and set reduction goals for 2020. According to the amended EU ETS directive, from 2013, the emission cap of EU member states will be set by EU. At least 50% allowance will be allocated by auction, and most member states will auction 100% allowance to power sector.

**The Carbon Pricing Mechanism of Australia**

On 8\(^{th}\) November 2011, the Australian senate finally passed a bill to introduce a domestic emission trading scheme, namely the Carbon Pricing Mechanism. The Australian government declared that it would formally launch a cap-and-trade market from 1\(^{st}\) July 2012. By sending a signal of carbon prices to the market, it aims to accelerate the transformation of its domestic economy, reduce carbon emission and stimulate the investment in clean energy. This is also the beginning for Australia to transform its economic development pattern. The carbon price mechanism is implemented in two phases. The first one, from 1\(^{st}\) July 2012 to 1\(^{st}\) July 2015, uses fixed carbon price at 23 AUD/tCO\(_2\), which will increase by 2.5% yearly. In the second phase from 1\(^{st}\) July 2015, the carbon price will be determined by the market. The Carbon Price Mechanism covers over 500 large enterprises in the energy, transportation, industrial and mining sectors, the emission of which accounts for over 60% of total emission in Australia.

**California Emission Trading Program under Assembly Bill 32 (AB32)**
Currently there is no nationwide mandatory emission trading system in the United States. However, as the US states enjoy a high legislative competence, they can facilitate cap-and-trade programs by their own. Therefore, an interstate emission trading scheme led by California government has been taken into force. The Global Warming Solutions Act of 2006, also called Assembly Bill 32 requires the California Air Resource Board (CARB) to develop regulation and market mechanisms to reduce California’s GHG emissions to its 1990 levels by 2020, representing a 25% reduction statewide. The CARB adopted the cap-and-trade regulation on Oct 20th, 2011, making California the first American states to pass cap-and trade program. As the eighth largest economy in the world, California’s move is highly influential to the global market.

California emission trading scheme commenced on January 2013, covering over 600 emission sources of 360 enterprises in electricity, petroleum refining and cement sector. Transportation fuel industry will be included in the Scheme from 2015, making 85% coverage of total state emissions. California ETS sets three compliance periods: 2013-2014, 2015-2027 and 2018-2020.

**Chapter 2. Key Elements of Carbon Market**

As a collection and carrier of carbon trading activities and the foundation of which those activities take place, a carbon market consists of various kinds of basic elements. Related to and affecting each other, these elements determine the formation and promote the development of a carbon market. The basic elements for carbon market include: laws and policies, infrastructure, regulatory mechanisms, market participants, enforcement mechanisms, flexibility mechanisms, adjustment mechanisms and trading rules. All those elements are indispensable for successfully running of a well-formed carbon trading market.
2.1 Laws and Policies

Laws and regulations are the precondition and basic guarantee for the existence of a carbon market. Emission cap set by relevant laws and policies can give exclusiveness and scarcity to carbon permits, then the emission rights turn into tradable commodity. Therefore laws and policies provide basis condition for a trading market. Take EU ETS as an example, the legal framework of EU ETS includes three levels: international laws, EU laws and domestic laws of EU member states.

Since the international legal framework has been described before in the report, the birth and development of EU laws and domestic laws concerning EU ETS will be introduced here.

At the EU level, Directives formulate the overall framework of EU ETS regulations and decisions determine detailed implementation measures. Among the four major EU ETS directives, the European Union Emissions Trading Directive (Directive 2003/87/EC) lays the legal basis for EU ETS. The Directive 2003/87/EC, as a basic document, is followed by three relevant amendments to expand and improve the EU ETS. The first one, Linking Directive (Directive 2004/101/EC) created the linkage between EU ETS and the KP mechanism as well as the emission trading schemes of other countries. The second one, Directive 2008/101/EC, included the aviation industry into EU ETS. The last one, Directive 2009/29/EC, clarified the objectives and contents of EU ETS in the third phase.

Meanwhile, EU has adopted, adjusted and improved relevant regulations or guidance for its registry system, MRV and allocation (free allocation and auction) gradually. For instance, DECISION No. 280/2004/EC raised the idea that EU and its member states should establish registry systems; DECISION 2011/278/EU regulated the unified EU allocation baseline; Monitoring and reporting guidelines (MRG) was published; COMMISSION REGULATION (EU) No.1031/2010 was published in 2010, November, which regulated the auction adjustment. Furthermore, the Decision No. 146/2007 adopted by the European Economic Area Joint Committee on 26 October
2007 included Norway, Iceland and Lichtenstein, which are non-EU members, into the EU ETS. These laws and policies set the tone for EU member states’ implementation. All the member states shall obey these EU regulations and implement in accordance with EU guidance. These laws and policies make the EU ETS unified and harmonized, although it is implemented by 27 sovereign national.

On the national level, there are the domestic laws that set rules and implement EU regulations. All the member states of EU shall formulate their own ETS emission goals in the first two phases, which is called national Allowance Plan. As the precondition for EU ETS to operate, NAP is the basis for member states to formulate corresponding operation rules. The domestic laws, as expansion and refinement of the carbon market legal system, act as guidance for the operation of a carbon market.

In Germany, for example, its domestic laws related to carbon market trading scheme are as follows.

The basic law of carbon trading: Treibhausgas- Emissionshandelsgesetz (TEHG), that is, German Greenhouse Gas Emission Allowance Trading Act began to enforce the EU Directive from 8 July 2004.

The supporting regulations (the relevant regulations for enforcement): the ZuG–Allocation Act in 2007 and 2012, based on NAP, lists emission targets, rules of allocation and emission allowance creation; and the Emissions Trading Auctioning Ordinance 2012 – EHVV 2012 regulates auctioning.

**2.1.1 Contents of Laws and Policies**

The most important function of laws and policies in carbon market is that the laws and policies regard GHG emission as rights. Then the carbon emission allowance becomes an artificial commodity with its value granted by laws and policies. Therefore, it is important to clarify the “right” of carbon emission at the very beginning of scheme design. The laws, regulations and policies of EU ETS, demonstrates coverage, emission cap and allocation plans, provide precondition for
the existence and development of a carbon market. These basic contents laws and policies shall regulate establishing and implementing a carbon market as follows:

**Coverage**

Coverage is not only the starting point to design a carbon market, but also been regarded as one of the biggest challenges in carbon market design. Whether the coverage is set reasonable or not will affect the effectiveness of the whole scheme to a large extent. Take EU ETS for example, it can be identified in three perspectives, namely industry, emission type and entity.

a. **Industry**

The industry covered by an emission trading scheme is of great importance, since the MRV rules, reduction targets and other relevant issues are all based on the industry and should be comparable with the covered industries. In the first phase, EU ETS covered a few industries with high emission like power and heat generation, steel, oil refining, chemical, glass, ceramics and construction materials (including cement), paper pulp and printing. Among these industries, the power industry is the first target to be regulated. In 2012, the aviation industry was included into EU ETS. In the third phase, more industries are covered such as petrochemical, hydrogen generation, soda and baking soda, black metal and nonferrous metal, mineral wool, gypsum, ammonia, aluminum and aluminum recycling etc.

b. **Emission type**

In the first and second phases, EU ETS only covered CO₂ emissions. And in the third phase it expands to include the six emission types decided by Kyoto Protocol, and also includes N₂O from acid industry (nitric acid, hexanedioic acid, glyoxal, glyoxylic acid) and perfluorocarbons (PFCs) from aluminum industry.

c. **Covered Entity**

The covered entities are mainly large emitters with high emission but low emission reduction and monitoring costs. In the first stage, the EU ETS included 12,000
installations in energy, steel, cement, glass, ceramics and paper pulp industries, covered 45% of the total EU GHG emission; in the second phase, it was expanded to more industrial facilities with nearly half of the CO\textsubscript{2} emission and 40% of the GHG emission in EU.

### 2.1.2 Emission Cap

In establishing a carbon market, the core is how to set and allocate the total emission allowances. When setting the cap for EU ETS, EU balanced centralized control and dispersion empowerment with considering flexibility and coordination. Guided and coordinated by EU, its member states establish their own NAPs relatively freely and flexibly. It is a combination of top-down and bottom-up policy mechanism. The NAP is the emission goal (national) set by each member states according to the promised emission reduction goals and baseline scenario emission anticipation of the Kyoto Protocol and the Responsibility Sharing Agreement. These NAPs come into effect after approved by the European Commission. However, in the second phase, NAPs of all the member states should fulfill the emission reduction goal promised in the Kyoto Protocol. In the third phase, EU commission unified and clarified emission reduction goal. The EU Climate and Energy Package passed in 2009 says EU will cut 20% emission in 2020 compared with the level of 1990, equal to a 14% decrease compared with that in 2005. Among this, EU will cut 21% emission in 2020 compared with the level of 2005. EU ETS emission cap is set in accordance with this emission reduction goal.

### 2.1.3 Allocation Mechanism
Allowance allocation mechanism is a crucial part in the designing and operation of emission trading scheme. Given the fact that actual emission is always higher than allowance cap, the allowance has a price, and becomes tradable commodity. As a result, the process of allowance allocation is essentially the allocation of property rights. The allocation mechanism includes free allocation and non-gratuitous allocation. (As can be seen in the following figure 6)

![Figure 6 Allowance Allocation Method](image)

Just as the name implies, free allocation is to allocate allowance to installations (enterprises) for free, with grandfathering and benchmarking as the most popular forms. The former is done according to historical emission while the latter according to certain benchmarks. Free allocation is first used in carbon trading, while other pollution emission rights or other environmental rights are allocated with charge according to the Polluter Pays Principle. While Non-gratuitous allocation means the installations (enterprises) covered by the emission trading scheme need to pay for allowance through auction or sales at a fixed price. The allowance price of auctioning is determined by the bidding of buyers, while the fixed price is decided by sellers.
2.1.4 Enforcement Mechanism

Strong and effective enforcement mechanisms could ensure expected results of a carbon market. The enforcement mechanisms of EU ETS mainly include Monitoring, Reporting and Verification Mechanism (MRV) and Penalty Mechanism.

MRV

Basic data system which could be monitored, reported and verified is the basis of a whole carbon market. According to the EU ETS Directive, responsible for the implementation of the whole scheme, the European Commission needs to submit an annual report to the European Parliament and the European Council respectively and set rules for MRV mechanism. The Monitoring and Reporting Guidelines (MRG) clearly defined detailed rules. Every company covered by EU ETS should formulate a monitoring plan according to MRG and follow this plan in annual monitoring. Emitters need to monitor emission, submit annual emission reports and get approved by a third party. The third party should be certified by the member states.

Penalty Mechanism

Penalty on poor compliance and default guarantees effective running of a carbon trading system. Article 16 of Directive 2003/87/EC has the stipulation of an automatic fine to emission exceeding allowance.

2.1.5 Flexibility Mechanism

While not affecting the goal of the whole system, flexibility mechanisms are designed to enhance the ability of the control entities to fulfill their compliance and cut the costs, and lessen the potential impact of the scheme over the competitiveness of industries covered and regional economies. According to the EU Linkage Directive, the member states could fulfill their obligation to cut emission through flexibility
mechanisms of Kyoto Protocol (ERUs of JI programs and CERs of CDM programs). However, this mechanism also has some restrictions.

**2.1.6 Adjustment Mechanism**

The adjustment mechanism is for market participants to intervene in the market according to the internal and external conditions of the market. When establishing EU ETS, EU has improved the whole mechanism phase by phase. Facing the problems occurring in the first stage, EU had some key improvements to EU ETS. Particularly the 2009/29/EC released in January 2008 had major reforms to some parts of EU ETS. For instance, when designing the allocation mechanism, EU adopted free allowances at the beginning. However with the over allocation to some power generators, in the third stage, the allowances are allocated by auction for the whole power sector.

**2.1.7 Trading Rules**

In the carbon market, the trading product is the allowances of the scheme and the credits from offset scheme, such as JI and CDM programs.

Carbon market has Exchanges and over-the-counter transactions as the marketplace. Open to the public, the Exchange market is featured by transparent information, centralized bidding trading and standardized contracts, with futures and options as representative derivatives. The over-the-counter market, despite poor information transparency, and no bidding and non-standardized contracts, could be more tailor-made for participants to bargain with each other. The major derivatives of over-the-counter market are swap transactions and forward transaction. The carbon market has both the spot market and futures market currently, both of which do transactions with standardized agreements.
2.2 Infrastructure

Reporting system, registration system and trading system are three interdependent pillars of infrastructure to an emission trading scheme. Together they form a unified technology platform. The reporting system provides emission data of compliance companies and serves as evidence in assessing the company's compliance. The registry system, as the core of the tree systems and the whole trading scheme, is a platform to store and circulate emission allowances and credits. The trading system constructs the platform for carbon trading. Besides, considering their own carbon management goals, information technology and internal management, companies collect data manually or automatically to better manage their own emission data and carbon assets with information technology.

2.2.1 Reporting System

Reporting system is a platform that conducts real-time measuring, monitoring and supervising on energy consumption and GHG emission. It collects energy consumption and emission data. To correctly calculate energy consumption and emission of all kinds of industrial and agricultural activities paves the foundation for emission reduction. It also provides necessary preparation for building carbon trading system and scientific basis for allowance allocations and emission management.

2.2.2 Registration System

The registration system not only traces on-line reserve of emission allowances, but also records the information of allowance holding and trading, emission and compliance. Whether the registry system is efficient and safe as well as matches the trading platform determines the effectiveness of the emission trading scheme in its
economic role and the maturity of the market.

According to 2004/280/EC, EU requested all the member states to build a national registration platform to record the creation, transaction and submission of their domestic European Union Allowance (EUAs). The platforms should consistent with each other. From 2012, the registration agencies in EU will not be independently managed by the member states themselves. All of them will be managed by a single new registration agency set up by the EU. This agency will record ownership of allowances rather than trading prices.

2.2.3 Trading System

The trading system is a platform where carbon trading takes place. As a basic platform for carbon emission trading, the trading settlement system is necessary for floor-based trading of spot transactions and futures transactions as well as over-the-counter trading (OTC) at exchanges. At present, the majority of allowance and CER transactions are done in the trading settlement system.

Climate exchanges, which originating around Europe become major institutions for trading, regulation and innovation gradually. The most important exchanges of EU ETS include: European Climate Exchange, Nord Pool, European Energy Exchange and BlueNext.

2.3. Supervision Mechanisms

As intangible products, carbon credits need to be supervised strictly. The key difference between a carbon market and an ordinary market lies in that it requires better credibility of things to be traded. Therefore, it’s necessary to have in place an integrated, transparent and strict supervision system.

The supervision of a carbon market is closely related to policies including: policies of entry standards for controlled enterprises, allowance allocation, emission data
reporting, registration regulation, compliance mechanism, and punishment towards companies to be supervised; policies of products traded, trading rules and entry mechanisms for participants towards the secondary market; the auction rules for auction agencies; and supervision policies for financial institutions. As to certain carbon markets (for instance the one in California of US), there are also position limit, price floor and price ceiling.

2.4. Market Participants

With different functions, rights and obligations, the participants collaborate with each other to advance the stable and continuous development of the carbon trading market.

The Participants in the carbon market mainly includes: organizers, regulators, participants engaged in trading and service institutions. The latter two are key players.

2.4.1 Participants Engaged in Trading

The Participants engaged in trading mainly include suppliers, demanders, and financial institutions which provide capital and risk control service --- carbon funds, intermediate, investment banks and commercial banks.

The participants who constitute major trading groups in the carbon market could be divided into two types: emitters and traders of investment.

The suppliers and demanders include the large number of companies and public institutions in EU member states, which have compulsory emission reduction tasks in the trading scheme. Besides, the suppliers also cover the providers of carbon credits in JI and CDM programs.

Investors are mainly investment banks, commercial banks, agents and insurance companies.

As a specific fund for GHG emission trading and the main purchaser in the primary market, the carbon fund could offer financing services such as equity investment,
entrusted loans and financing guarantee. It’s an important tool in the international carbon market.

Intermediate, active role in the carbon market, gain profits from selling in the secondary market the CERs bought from developing nations and approved by an international third party.

Investment banks conduct security exchanges, directly invest in CDM programs or help clients to buy and sell emission credits to gain profit.

Commercial banks provide diversified financial products and services for the participants in the carbon market.

2.4.2 Service Institutions

Service institutions include trading platforms (exchanges), insurance institutions, rating institutions as well as information and consultation institutions.

Trading platforms (exchanges) could not only offer a channel and open trading platform for investors, financial institutions and companies to enter into the financial market, but also regulate trading activities and enhance the liquidity in the market.

Insurance institutions help companies intents to invest on low carbon technology and carbon market trading participants with financing and risk aversion. The insurance for carbon financial risks is called carbon insurance.

Rating agencies mainly include:

(1) Rating agencies in the capital market to include carbon financial elements in to security ratings and trace the emission trading market.

(2) Carbon credit rating agencies. As independent carbon credit rating agencies, they turn carbon credits into standardized commodities and create new asset types related to carbon offset or carbon credits, so as to enable investors to assess programs of which carbon credit rating has been done with the same standard around the globe,
and choose those qualified ones.

Information and consultation service institutions offer services of information, analysis, consultation and technology to market participants.

The key difference between a carbon market and an ordinary market lies in the third-party certification system. The Designated Operational Entity (DOE) is an unique institution for the carbon market. All DOEs should be authorized and strictly regulated by the UN, regional or national official regulators. At an important position in the carbon market, the DOEs conduct compliance certification towards actual emission of companies and new credits from emission reduction programs to examine whether they are qualified and determine their volume of emission reductions. The verification of the actual emission of enterprises is significant in the trading scheme. The third-party certification demonstrates that the establishment and trading of carbon credits are both independent. Only the carbon credits certification and verification by the DOEs could be traded in the market.

2.5 Carbon financial instruments and products

2.5.1 Carbon financial instruments

The carbon emission right has possessed the attributes of a financial product since the European Climate Exchange introduced the futures and options of carbon emission right in 2005. According to the classification method of traditional financial instruments, carbon financial instruments can be divided into primitive instruments and derivative instruments.

(I) Primitive carbon financial instruments. Primitive carbon financial instruments, also called fundamental instruments, include carbon credit trading and carbon spot trading. AAU under the International Emissions Trading Mechanism, ERU under the Joint Implementation Mechanism, CER under the CDM and EUA under the EU ETS all boost the features of a primitive carbon financial instrument and are widely adopted in
the carbon financial markets of developed countries.

(II) Derivative carbon financial instruments. In recent years, as financial institutions participated on a more in-depth basis, a variety of carbon financial derivatives developed considerably. The derivatives provide new approaches for risk management and arbitrage for both those demanding carbon emission rights and those supplying carbon emission rights. Currently, the main carbon financial derivatives include:

1. Monetization/securitization of carbon emission rights. The primary CDM trading belongs to a forward trading and its return comes from the transfer of the obtained emission reduction units after the registration of a project. Before the delivery of the project, the investment or loan for the emission reduction project lacks of liquidity. To increase liquidity, CDM projects can be sold to investment banks or carbon credit buyers and those carbon assets are collected in an asset pool, the cash flow (CER income) from such pool is used to support the finance of negotiable securities in the financial market for financing. Finally, the cash flow is used to pay off the issued negotiable securities. At present, restricted by the present legal framework, the securitization of carbon assets hasn’t been widely implemented.

2. Guarantee for the delivery of carbon emission rights. For primary CDM trading, there is uncertainty about the project success, and it means that the investor or loaner faces risks. In this case, the investor or loaner will lower the original project price substantially, which places the development of the emission reduction project at a disadvantage or even strangles some risky but promising innovative emission reduction projects. In that condition, financial institutions provide guarantees (credit enhancement) for the number of emission reduction units finally delivered by the project. This helps to increase the income from project development and reduce the risks for the investor or loaner.

3. Arbitrage trading instrument. The trading instruments in different carbon finance markets are different, and there is price difference between markets. With equal emission reductions involved, the price difference between the emission reduction
units (such as EUA, CER and ERU) belonging to the same quota management system and adopting the same certification standard, its variation will definitely result in some room for arbitrage and the faster development of the instruments utilizing the market price difference for arbitrage, which include exchange between CER and EUA and that between CER and ERU, the option based on the price difference between CER and EUA, etc..

4. Carbon insurance. There are many risks during project trading, such as price fluctuation, failure to deliver on time, and failure to pass the certification by the regulatory authority, all of which might bring about loss to the investor or loaner. Insurers or guarantors should intervene to spread risks as necessary and provide similar guarantee to promote the project liquidity. The carbon trading insurance can provide insurance for both the purchaser and the seller of a carbon trading contract or a carbon emission reduction purchase agreement. If the purchaser cannot obtain the CER in the amount specified on the agreement as scheduled after paying insurance, the insurance company will compensate as agreed; the enterprise developing a CDM project may also be provided with guarantee; if the enterprise cannot develop a project with huge development potential into a CDM project after purchasing insurance, the enterprise will obtain the CDM project development insurance provided by the insurance company.

5. Bond linked with the carbon emission rights. In the past few years, investment banks and commercial banks began to offer structural investment products linked with the emission reduction unit price and its payments change as the emission reduction unit price fluctuates. Among the structural investment products, some are linked with spot price (no delivery risk), some are linked with original emission reduction unit price (with delivery risk) and some others are linked with the delivery amount of certain projects.

6. Loan with CER income right being the pledge. The enterprise with sound CDM project development potential and credit records applies to banks for loans by pledging CER income right. As a kind of future income right, the CER income right
has substantial uncertainty, so when the bank provides such pledge loan to the enterprise, the bank shall pay meticulous attention to the risk in the enterprise’s realizing the CER income right. For the enterprise with CER issuance, the truthfulness and effectiveness of CER issuance amount of the CDM project of the enterprise shall be verified; for the CDM project registered in the United Nations, the project progress shall be closely followed, the interest rate shall be increased to mitigate risks.

7. Other carbon financial derivatives. They include carbon financial products offered by banks or insurance institutions: commercial banks provide loans and necessary consulting service to the enterprise developing a project, guarantee for the development of original carbon emission right, and serve as market makers in the secondary market to provide necessary liquidity for carbon trading, develop innovative financial products, provide risk management tools for the end user of carbon emission rights, or new financial investment instruments for investors, such as green credit cards and carbon neutral products.

**2.5.2 Carbon futures products**

The carbon futures product is a basic carbon financial derivative product, and its sound development is of significance for promoting the development of the carbon finance and its derivatives.

The carbon finance derivative, relative to the primitive carbon finance product, includes futures, option, forward, exchange and structural bills; most of them are intended to avoid the risks related with primitive carbon financial products, so their prices depends on the related primitive carbon financial product price.

1. CER forward trading. The two parties of the CDM project trading enter into a contract to specify the price, amount and time of the trading before the project starts, so it belongs to a forward carbon trading. According to the pricing mode, forward carbon trading contracts are classified into two types, fixed price ones and floating price ones. A fixed price is made up of basic price and European Union reference
price, and calculated by adding the floating price linked with quota price to the lowest floor price.

2. Carbon futures trading. The carbon futures mean to purchase carbon futures contracts to replace EUA on the spot market so as to guarantee the price of EUA to be sold or purchased later to avoid and transfer price risk. Thus, by carbon futures, the carbon price can be found out; in the global carbon market, the spot trade volume accounts for a minor percentage, while the futures trading is the mainstream and its volume is rapidly rising as the carbon trading develops. The annual global carbon trading market size in 2011-2010 amounted to over US$60 billion, with the futures trade volume accounting for more than 1/3.

3. Carbon option trading. The carbon option is a derivative instrument arising from carbon futures. After the introduction of the EUA option by ECX in 2005, due to the influence of the financial crisis, the need for avoiding risks, and the participation by fund, energy trading companies and industrial enterprises, the market functionality, liquidity and complexity are gradually enhanced and the carbon option market develops rapidly.

For carbon option trading, take the CER option as an example. When the CER price is expected to rise, the CER purchaser will purchase call options to hedge against the future risk of price rise; if the CER price falls, the CER purchaser will excise the call option for benefit; on the contrary, when the CER price is expected to fall, the seller will purchase put options to secure profits.

4. Main products of carbon futures and options. At present, there are mainly the following several products of carbon financial futures and options:

European Climate Exchange Carbon Financial Instrument. This contract is a high-level and low cost financial guarantee instrument under EU ETS.

EU Allowances Futures (EUA Futures). This product, uniformly established by the exchange, is a standardized contract for purchasing and selling in a centralized manner, specifying the carbon credit of certain quality and quantity at certain future
time and place. Its price is agreed on in the exchange through public pricing.

Certified Emission Reductions Futures (CER Futures). In order to adapt to the continuously increasing need of the CER market, the ICF Futures introduced CER futures contracts to avoid the risk arising from the substantial fluctuation of the CER price.

EU Allowances Options (EUA Options). The EUA options grant the holder/purchaser the right to execute this contract on or before the due date of the options, and the purchaser/seller is obliged to fulfill the contract.

Certified Emissions Allowances Options (CER Options). The CER call or put option obtained by the CDM projects is issued.

5. Carbon arbitrage and exchange trading

The carbon arbitrage exchange is the financial activity to make a profit by the price difference and change of different carbon credit products. The carbon emission products adopted for arbitrage must be subject to the same certification standard and the management by the same quota regulation system. When the carbon emission reductions involved in the contract are also equal, the market price difference will allow for certain room for arbitrage. The common carbon emission products for arbitrage in the market include the exchange between CER and EUA, and that between CERs, taking the price difference between CER and EUA as the price difference option of the underlying asset.

The purpose of arbitrage trading is intended to benefit from price changes. The speculators in the secondary market, include some carbon funds, forecast the future market trend, and purchase and sell carbon financial derivatives frequently with their capitals. However, they normally do no need maintaining values, and they do not concern the actual delivery of carbon emission reduction units; their only purpose is to obtain profits from price changes.

The carbon exchange system is another approach to produce carbon reduction credit.
According to the current carbon exchange practice, there are two exchange systems: first, the debt and carbon reduction credit exchange system. That is, at the creditor nation’s request, the debtor nation invests some funds in a carbon emission reduction project, and the carbon emission reduction index arising therefrom belongs to the creditor nation to offset the debt between the two nations. Second, greenhouse gas emission exchange system. Under this system, certain government organization or private entity obtains relative carbon emission reduction credits by sponsoring the carbon emission reduction projects in other nations. It, in essence, is the exchange between foreign investment and carbon emission reduction credit.

Chapter 3. Potential and Challenge of Carbon Finance Development in PRC

3.1 Current Status of PRC’s Carbon Market

Currently, PRC only participate in the international carbon market indirectly through CDM, and although it performs quite well in the international CDM project market with an absolute dominant market share, PRC is the downstream of the CDM market and is dependent on and vulnerable to the evolving international climate regime and domestic policies of major CER importing countries, especially the European Union. With the EU banning on Chinese CDM projects newly registered after 2012, and other developed countries are likely to follow EU’s suit, PRC’s old way of participation in the international carbon market is facing tremendous challenge. However, the experiences of CDM participation helped policy makers in PRC understand the role and value of market mechanism. If PRC wants to continue to utilize carbon market as an effective tool to channel resource to emission reduction and promote low carbon development, it would need to establish a new independent domestic carbon market. It is against this background that PRC decided to start establishing regional Emission Trading Scheme on a pilot basis in selected provinces and municipalities, with the aim of testing the feasibility of market mechanism in
PRC and accumulating experiences for the final launch of a national unified ETS.

On October 29, 2011, the General Office of the National Development and Reform Commission issued the Notice on the Implementation of Pilot Carbon Emission Trading, which approves the four cities including Beijing, Tianjin, Shanghai, Chongqing and Shenzhen, and two provinces including Hubei and Guangdong, to firstly establish carbon trading pilot programs. All pilot regions are requested to organize the formulation of the pilot carbon trading implementation plan and the administrative measures, to actively construct the infrastructure and supporting system for pilot trading, in order to achieve the objective of controlling greenhouse gas emission in a more cost effective way with market mechanism, and speeding up the transition of economic development mode and the upgrade of industrial structure.

The above mentioned 7 regions, based on experiences of existing domestic carbon markets abroad and their early participation in the CDM market, are now developing implementation plans on establishing pilot carbon trading schemes, including legislating administrative measures which provide legal basis for pilot ETS and building various technical elements, components and infrastructures, such as cap setting, allocation plans, monitoring, reporting and verification system, registry system, trading platforms and rule, flexible mechanism, market oversight systems, etc.

The intensive preparatory work for the launching of pilot ETS in 7 regions were mainly taken in 2012, and progress has been made in various regions. It is anticipated that the 7 regions would finish all the preparatory work and launch pilot ETS programs in 2013, and a national unified ETS based on the 7 pilots would be ready during the 13th Five Year Plan period, which is between 2016 and 2020.

So far, positive developments have been made in carbon trading pilot program in PRC. Kick-off meetings were held in Beijing, Shanghai and Guangzhou in March, August and September respectively. On July 2012, Shanghai Municipal People's Government issued the official document named Opinions on Implementation of Emission Rights Trading Pilot Project specifying the framework, major components and tasks and work plan of the Shanghai pilot ETS program. On September 2012, Guangdong
Development and Reform Commission released the Implementation Plan of Emission Trading Pilot Program, specifying also in detail the guidelines components and arrangements of the pilot scheme. On October 2012, the Standing Committee of Shenzhen Municipal People’s Congress passed a legislative document named Rules on Carbon Emission Management in Shenzhen Special Economic Zone. As local level legislation, it has put in place systems for emission allowance management and allowance trading, and most importantly has authorized the municipal government to fine non-compliance enterprises three times the average carbon allowance price for each ton of the deficit emission.

However, based on foreign practices and experiences have proven that emission trading scheme is a rather complicated policy tool which goes beyond elements design and technical details of pilot plans to human resources, government management systems, and more broadly market environment and related supporting policy environment.

As for PRC, pilot program of carbon trading is only the first step for a domestic carbon market. As preparatory work of pilot schemes continues and the early implantation follows, more problems will emerge inevitably. PRC will advance the program through discovering problems, solving problems and accumulating experiences. Gradually, PRC will improve infrastructure consisting of systems designing, capacity building, management system, methodologies and standards, and trading platforms. A number of consulting agencies and third party service agencies would also emerge to provide service to relevant parties for the efficient operation of the carbon market. Gradually, a mature, full-fledged and stable domestic carbon trading market would emerge when conditions allow.
### Table 2. PRC ETS: Design and Implementation

<table>
<thead>
<tr>
<th>National ETS</th>
<th>Beijing</th>
<th>Shanghai</th>
<th>Guangdong</th>
<th>Hubei</th>
<th>Tianjin</th>
<th>Chongqing</th>
<th>Shenzhen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Share of national GHG emissions (%)</strong></td>
<td>1.9%</td>
<td>3.0%</td>
<td>1.8%</td>
<td>6.7%</td>
<td>3.4%</td>
<td>1.8%</td>
<td>Included in the Guangdong Province data</td>
</tr>
<tr>
<td><strong>Emission Threshold for coverage in the ETS</strong></td>
<td>10,000 ton CO₂ e</td>
<td>20,000 ton CO₂ e for industry</td>
<td>10,000 ton CO₂ e for non-industry</td>
<td>20,000 ton CO₂ e</td>
<td>Approx. 120,000 ton CO₂ e (60,000 tce)</td>
<td>20,000 ton CO₂ e</td>
<td>20,000 ton CO₂ e</td>
</tr>
<tr>
<td><strong>Reporting requirement threshold</strong></td>
<td>5,000 ton CO₂ e</td>
<td>10,000 ton CO₂ e</td>
<td>10,000 ton CO₂ e</td>
<td>Approx. 16,000 ton CO₂ e (8,000 tce)</td>
<td>20,000 ton CO₂ e</td>
<td>20,000 ton CO₂ e</td>
<td>Industry: 3,000 ton CO₂ e; buildings in specific areas</td>
</tr>
<tr>
<td><strong>Sectors covered</strong></td>
<td>Power, heat production and supply, petrochemical, cement, other industry sectors and service</td>
<td>17 sectors. 10 industry sectors: Iron &amp; steel, petrochemicals, chemical engineering,</td>
<td>Power, cement, iron &amp; steel and petrochemical.</td>
<td>Iron &amp; steel, petrochemical, cement, power, paper</td>
<td>Iron &amp; steel, chemical, power, heating, petrochemical, oil &amp; gas drilling, and residential buildings</td>
<td>Electrolytic aluminium, iron alloy, calcium carbide, sodium, cement, and iron &amp; steel</td>
<td>Power, water supply, manufacturing industries (26 sectors) and buildings</td>
</tr>
<tr>
<td>National ETS</td>
<td>Beijing</td>
<td>Shanghai</td>
<td>Guangdong</td>
<td>Hubei</td>
<td>Tianjin</td>
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<tr>
<td>sectors</td>
<td>non-ferrous, power, building construction, textile, pulp &amp; paper, rubber and chemical fibers..</td>
<td>non-ferrous, plastics, pulp &amp; paper, transportation and buildings</td>
<td>7 non-industry sectors: aviation, airports, ports, railways, hotels, commerce and finance.</td>
<td>To be covered: transportation and 5 more manufacturing industries (electroplating, etc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Enterprises covered</td>
<td>Approx. 500</td>
<td>197</td>
<td>310</td>
<td>153</td>
<td>More than 100</td>
<td>200-300</td>
<td>635 industry enterprises and 197 buildings</td>
</tr>
<tr>
<td>Percentage of total emissions in the region</td>
<td>49%</td>
<td>45%</td>
<td>54%</td>
<td>35%</td>
<td>60%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Use of offsets</td>
<td>CCER, 5% (half from local projects)</td>
<td>CCER, 5%</td>
<td>CCER, 10% (70% offsets from local projects)</td>
<td>CCER, 10% (only from local projects)</td>
<td>CCER, 10% (only from local projects)</td>
<td>CCER, 8% (only from local projects)</td>
<td>CCER, 10% (especially from projects located in mid- and western PRC developed by Shenzhen)</td>
</tr>
<tr>
<td>National ETS</td>
<td>Beijing</td>
<td>Shanghai</td>
<td>Guangdong</td>
<td>Hubei</td>
<td>Tianjin</td>
<td>Chongqing</td>
<td>Shenzhen enterprises</td>
</tr>
<tr>
<td>-------------</td>
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<td>---------</td>
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<td>---------------------</td>
</tr>
<tr>
<td><strong>Trading Venue</strong></td>
<td>PRC Beijing Environment Exchange</td>
<td>Shanghai Energy and Environment Exchange</td>
<td>Guangzhou’s PRC Emission Exchange</td>
<td>Venue is under development</td>
<td>Tianjin Climate Exchange</td>
<td>Venue is under development</td>
<td>PRC Shenzhen Emission Exchange</td>
</tr>
<tr>
<td><strong>Expected Start date (estimation)</strong></td>
<td>After 2016</td>
<td>November 2013</td>
<td>November 2013</td>
<td>19 December 2013</td>
<td>2014</td>
<td>Late 2013</td>
<td>2014</td>
</tr>
<tr>
<td>National ETS</td>
<td>Beijing</td>
<td>Shanghai</td>
<td>Guangdong</td>
<td>Hubei</td>
<td>Tianjin</td>
<td>Chongqing</td>
<td>Shenzhen</td>
</tr>
<tr>
<td>--------------</td>
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<td>---------</td>
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<td>----------</td>
</tr>
<tr>
<td><strong>Penalty for non-compliance</strong></td>
<td>1. deducting the shorted allowances; 2. imposing penalties equal to the larger of 3 times the average price or 300 CNY/ton of allowances for shortages.</td>
<td>1. deducting allowances equal to compliance shortage from the registry account; 2. imposing fine between 50,000 to 100,000 CNY.</td>
<td>monetary penalties equal to 3 times the price of allowance(up to 100,000 CNY)</td>
<td>1. deducting 2 times the shorted allowances from next year's allowances; 2. monetary penalties equal to 3 times the annual average price of allowances for every shortage.</td>
<td>1.deducting 2 times the shorted allowances; 2.imposing fine of 30,000 CNY.</td>
<td>imposing penalties equal to 3 times the average price of the latest trading day in compliance period for shortage.</td>
<td>1. deducting the shorted allowances from next year's allowances; 2. imposing penalties equal to 3 times the average price of allowances during past six months for shortages.</td>
</tr>
</tbody>
</table>
Meanwhile, PRC is proactively developing its domestic voluntary carbon market. GHG Voluntary emission trading is an integral part to carbon market building in PRC, and would likely be developed into the offset mechanism to PRC’s national ETS. As a vital part of carbon market, PRC has made progress in voluntary emission reduction in recent years. On Jun 13, 2012, the NDRC promulgated the Interim Regulation of Voluntary Greenhouse Gases Emission Trading in PRC. The Interim Regulation identified the managing rules for covered sectors, managing departments, participants, record keeping system and national emission registry as well as voluntary emission projects, reduction volume, emission trading, verification and certification. On October 9, 2012, the NDRC released Guidelines on Validation and Certification of Greenhouse Gas Voluntary Emission Reduction Project. This is another significant initiative taken by NDRC to promote trading activities relating to GHG voluntary emission trading. PRC’s GHG Voluntary emission trading projects are standardized and managed on a consolidated basis by the State, and they are literally similar to project based offset mechanism under CDM.

3.2 Development of Carbon Finance in PRC

The Chinese Government attaches great importance to development of low carbon economy. In the Central Economic Working Conference held in December 2009, the central government determined that the focus of future economic work should be on adjustment of economic structure and transformation of development mode, so the comprehensive transition to a low carbon economy would be the main direction of PRC’s future economic development. As the “low carbon” concept gradually takes root, low carbon economy begins to produce benefit. However, the development and rapid growth of low carbon economy and industry face barriers that prevent financial flows and technology into this sector. As technology could not be developed and applied without the support of funds, and funds form the core for the development of low carbon economy in PRC. Finance, an important means and approaches for the optimization of resource allocation and redistribution of funds, will definitely play a
major role in the development of low carbon economy in PRC.

3.2.1 Overview of Green Finance Policy

PRC’s green finance policies mainly comprise of green credit policy, green insurance policy and green securities policy.

**Green Credit Policy**

The green credit means a series of policies, systematic arrangement and practice by commercial banks to provide loans or other financing tools to promote energy conservation and emission reduction.

In the transformation to a low carbon economy, the banking sector is irreplaceable for effectively implementing policies on environmental protection, energy conservation and emission reduction. The addition of “green” factors into the financing activity of banking business, namely green credit, can effectively support the environmental protection authority in control of environmental pollution and ecological destruction and balance the economic growth, investment return and environmental protection.

By introducing green credit, the financial risk from non-performing loan due to environmental problems can effectively be avoided. As the government is strengthening energy conservation and emission reduction, and tightening environmental monitoring and management, many enterprises creating severe pollution are shut down or restricted in production, and non-performing loans arising from environmental problems increase. As the safety of the credit funds from such financial institutions as banks were subject to adverse influence, financial institutions were impelled to give careful consideration of the financial risk induced from environmental problems and conduct corresponding credit management and risk control.

In 1995, the People’s Bank of PRC issued the Notice on Issues Concerning the
Implementation of Credit Policies and the Strengthening of Environmental Protection, which demanded that the support of the protection of ecology & resources and the prevention & control of pollution shall be one consideration for bank credit.

In 2004, the National Development and Reform Commission, the People’s Bank of PRC and the Banking Regulatory Commission jointly issued the Notice on the Issues Concerning the Further Strengthening of the Coordination of Industrial Policies and Credit Policies to Control Credit Risks, which specified that credit support should not be provided to new projects that should have been limited or eliminated.

In 2007, the Ministry of Environmental Protection, the People’s Bank of PRC and the Banking Regulatory Commission jointly issued the Opinions on Implementing Environmental Protection Policies and Rules and Preventing Credit Risks, which was intended to control the provisions of credit to enterprises or projects that did not comply with the industrial policy or violate environment laws, and to curtail the blind expansion of highly energy consuming and highly polluting industries. Henceforth, the green credit policy system in PRC was beginning to be implemented formally in a comprehensive way. Afterwards, relevant authorities further promulgated a series of policy documents to improve the green credit policy system, including the Notice on the Prevention and Control of the Credit Risk from Highly Energy Consuming and Highly Polluting Industries and the Guiding Opinions on the Credit Granting for Energy Conservation and Emission Reduction.

In 2009, the Ministry of Environmental Protection and the People’s Bank of PRC jointly issued the Notice on the Comprehensive Implementation of Credit Policies and the Further Perfecting of Information Share, which defined the scope, time limit and mode of information exchange. The information on the illegal practice of enterprises were forwarded by the Banking Regulatory Commission to the commercial banks, the latter took the environment information as an important basis for the approval of credit and post-credit supervision, thereby cutting off the chain of funds for polluting enterprises.
In 2010, the People’s Bank of PRC and the Banking Regulatory Commission issued the Opinions on Further Effectively Providing Financial Services for Supporting Energy Conservation, Emission Reduction and Elimination of Backward Production Capacities, according to which the energy conservation and emission reduction and the elimination of backward production capacities became an important reference basis for the management of credit by banks. The credit resource was to be reasonably allocated, and the functional role of finance was to be given full play to so as to ensure the realization of the abovementioned objectives in the “Eleventh Five-Year Plan”.

From 2011 to February of 2012, PRC Banking Regulatory Commission consecutively issued the Notice on the Comprehensive Summarization of Credit Granting for Energy Conservation and Emission Reduction and the Effectively Conduction of Green Credit Related Work and the Guidance on Green Credit, which pointed out that the green credit should be promoted at strategic level, the support for green economy, low carbon economy and circular economy should be strengthened, environmental and social risks should be prevented.

Since the promulgation of the said state-level policies on green credit, local environmental protection authorities, banking regulatory authorities and branches of the People’s Bank of PRC coordinated actively, the commercial banks also participated and involved themselves in the work, so that PRC’s green credit policies played a positive role. The green credit, as a very active environmental and economic operation instrument, has attracted considerable attention from the industries such as environmental protection and finance, and has become an important market instrument to promote energy conservation and emission reduction with remarkable achievements.

However, the efficiency and effect of the green credit policy is undermined by problems such as the imperfect policy system itself, lack of effective implementing means, poor information communication and lack of supervision, assessment and restriction mechanisms, etc. So the information communication shall be enhanced,
and the supervision, assessment and restriction mechanisms for the green credit policies shall be established to improve the efficiency of green credit policies.

**Green Insurance Policy**

The green insurance policy mainly takes the form that insurance with compensation liability arising from the damage to third party caused by pollution incident of an enterprise. That is to say, a highly risky polluting entity, as the policyholder, pays insurance premium to the insurance company in advance according to certain rate to cover possible environmental risk accidents. In case of a pollution incident, the insurance company compensates the pollution victim for certain amount.

In 2007, the Ministry of Environmental Protection of PRC and the PRC Insurance Regulatory Commission jointly issued the Guiding Opinions on the Insurance for Environmental Pollution Liabilities, which proposed the requirements for the guideline, work objective, implementation and guarantee mechanism for the insurance for environmental pollution liabilities, and became the most directive policy document about the insurance for environmental pollution liabilities at the national level. In this document, the “green insurance” system road map was formally established for better supervising the polluting industry, and all industries with pollution risks were required to be insured so as to help the victims of pollution incidents to obtain compensations promptly.

But the insurance for the environmental pollution liability in PRC is still in its beginning stage. The associated laws and regulations, policies and standards lag behind. Relevant market development is to be regulated. Therefore, to accelerate the establishment and improvement of relevant laws, policies and standards are the prerequisite to promote the development of the insurance for the environmental pollution liability in PRC.
**Green Security Policy**

The green security policy is another measure adopted by the regulatory authority following “green credit” and “green insurance” to adapt to climate change and control pollution. Currently, the greening of securities refers to the company going through environmental protection examination before issuing its securities.

In February of 2008, the Guiding Opinions on the Strengthening of the Supervision and Administration of Listed Companies in Environmental Protection jointly issued by the Ministry of Environmental Protection and the PRC Securities Regulatory Commission required that listed companies shall disclose more information related to environmental records, which increased the difficulty in fund raising by polluters. The Administration Catalog of Classified Industries on Environmental Protection Audit for Listed Companies issued in June of 2008 strengthened the “green securities” policy. This regulation required that “high-tech and highly value-added” enterprises shall be subject to the environment assessment by the Ministry of Environmental Protection before Initial Public Offer (IPO) or refinancing.

The intention of economic instruments such as “green securities” and “green credit” is mainly to cut off the financing channels of polluting enterprises. Although they improved the financing competitiveness of environment-friendly enterprise peers to a certain degree, but the effect is limited, since no concrete incentive mechanism is provided to facilitate the regulation. Therefore, further assistance and policy support to environment-friendly enterprises that make contributions in energy conservation and emission reduction shall be enhanced.

The said three classes of green policies above initially constitute PRC’s toddling green finance system. However, the further exploration and implementation of green finance policy in PRC are increasingly involving the interests of various stakeholders and the corresponding effect are far reaching. Support from various administrative departments and even higher political level is required.
3.2.2 Actions of Domestic Financial Institutions

Carbon Finance of Banking Sector

In recent years, commercial banks regarded low carbon credit as one strategic business for adapting to the new trend of green economy and grasping new business opportunities. They had tasted some business modes combining finance service with the concept of low carbon development. In addition, the development of green finance provides banks chances of differentiated competition and public image promotion by introducing green finance to the public.

Many commercial banks, based on low carbon credit, innovated their financial products to actively support energy conservation, emission reduction and environmental protection.

(1) Green credit business: In July of 2007, the Ministry of Environmental Protection, the People’s Bank of PRC and PRC Banking Regulatory Commission jointly issued the Opinions on Implementing Environment Protection Policies and Rules and Preventing Credit Risks, which put forward the concept of green credit. This was an important regulation jointly issued by the three authorities the first time for implementing national environmental protection policies and regulations, promoting energy conservation and emission reduction and preventing credit risks. In 2012, the Banking Regulatory Commission issued the Guidance on Green Credit, demanding that banks shall give financial leverage into full play to promote energy conservation and emission reduction and environmental protection. The Guidance required that the financial institutions in the banking sector shall implement the Comprehensive Work Plan for Energy Conservation and Emission Reduction in the “Twelfth Five Year Plan”, the Opinions of the State Council on Strengthening Major Environmental Protection work and other macroeconomic control polices, promote green credit at strategic level, strengthen the support for green, low carbon and circular economy, prevent environmental and social risks, optimize credit structure accordingly, improve service, and better serve real economy to promote the transformation of low carbon
development.

In recent years, some commercial banks under the guidance of the regulatory authorities took the support for energy conservation and emission reduction and environmental protection as an important part of their operation strategies, established effective green credit promotion mechanisms and relatively set environmental and social risk management systems.

(2) **Innovation in carbon financial service:** In respect of the financial service, many commercial banks like Bank of PRC, Shanghai Pudong Development Bank and Shenzhen Development Bank innovated, made breakthrough and launched the service products linked with carbon emission trading. Taking the carbon asset mortgage financing, the innovative comprehensive financial service program in the carbon trading pilot introduced by Shanghai Pudong Development Bank, as an example, on the condition that such carbon assets as the carbon emission allowances or PRC’s certified emission reductions (CCER) provided by the carbon trading enterprise (the borrower) with the disposal right for such assets is obtained as the security guarantee, Shanghai Pudong Development Bank provides financing to the carbon trading enterprise and help to realize diversified financing in the field of energy conservation & emission reduction. This improves the financing capacity and increases the total amount of trading funds in the carbon market, facilitates enterprises to participate in the carbon market, and boosts the trading volume and vitality of the whole carbon market.

**3.2.3 Carbon Finance in Fund Industry**

Carbon fund is raised by the government, multilateral institutions or the private sector, and it participates in the carbon market through the setup of various types of financing instrument. For the time being, PRC has no true carbon fund. The PRC Green Carbon Fund and PRC Clean Development Mechanism Fund are the rate funds related to
carbon sink and CDM in PRC.

Commonly PRC’s carbon funds can be generated from five sources: first, the income of the state from the CDM project proceeds according to specified proportion; second, the donations and other cooperation funds from such international financial organizations as the World Bank and the Asian Development Bank; third, income from the operation of fund business by the Fund Management Center; fourth, the donations and other cooperation funds from domestic or foreign institutions, organizations and individuals; and the fifth, other income sources approved by the State Council. PRC’s carbon funds shall be used in the four following fields: first, building capacity and raise public awareness on climate change and carbon reduction; second, mitigation of climate change; third, adaption to climate change; and fourth, financial activities serving the operation of sustainable business of the fund.

Moreover, funds are mainly used in two approaches: namely donation and paid use. The donation mainly supports policy research, capacity building and publicity. It is reported that, in 2011, the CDM Fund prepared 260 million CNY of budget for the second batch of donation projects and subsidized 125 projects. On the other hand, the paid use mainly supports the industrial activities beneficial to addressing climate change. In 2011, the paid use of funds started from entrusted loan, the CDM Fund entrusted a PRC-funded bank or PRC-funded holding bank to provide domestic enterprises involved in combating climate change with load with the term no longer than three years, and the interest rate 15% lower than the guide interest rate of the People’s Bank of PRC of the same period. Up to the end of 2011, 13 provinces applied for entrusted loan project candidates to the CDM Fund. The CDM Fund has completed the review, contract signing and loaning of 21 projects in 8 provinces. The loan totaled 1.02 billion CNY, and now these projects have entered the implementation stage. Besides, another 10 projects have entered the application review process and the amount of the loans involved totals 517 million CNY. The said 31 projects cover such fields as renewable energy, energy conservation, energy efficiency improvement, new energy equipment and material manufacturing.
3.2.4 Carbon Finance of the PRC Beijing Environment Exchange

PRC Beijing Environment Exchange (CBEEX), officially opened on August 5, 2008, is a franchise entity approved by the Beijing People’s Government, and funded by Beijing Equity Exchange Ltd, New Energy Investment Co., Ltd. of PRC National Offshore Oil Corporation (CNOOC), PRC Guodian Corporation and PRC Everbright Investment Management Corp.

During the Copenhagen Climate Conference held in December 2009, CBEEX introduced the Panda Standard - the first voluntary carbon emission reduction standard in PRC. On the one hand, it set the standard and principle for the measurement of voluntary emission reduction in the narrow sense; on the other hand, it defined the voluntary emission reduction process, the appraisal institution, and rules in the broad sense. The formulation of the Panda Standard could promote the development of ecological compensation projects in PRC.

On June 5, 2010, CBEEX and the Energy Conservation Service Industry Committee of PRC Energy Conservation Association jointly and formally launched the world’s first investment, financing and trading platform for energy management contracting. By virtue of this platform, the third party investor can purchase the future energy conservation proceeds of the energy conservation service company, while the latter fulfills financing due to early realization of energy conservation proceeds. It, to a certain extent, can solve the difficulties in financing or obtaining of information during energy management contracting, promote the energy conservation service company to rapidly launch new energy management contracting projects, facilitate the development of energy performance contracting and energy conservation service industries, and also importantly, at the meantime, create world’s first trading mode that allows social funds to enter the energy conservation field.
Meanwhile, CBEEX, together with some other foreign exchanges, jointly established a voluntary emission reduction project market trading platform in PRC. It looked for enterprise purchasers through the carbon neutral alliance program and, in particular, developed international purchasers by joining hands with the environment exchange institutions in France, the USA and Korea etc.

Up to the middle of 2011, CBEEX made a match for 113 CDM projects with a trading volume of 1.8 million tons, and helped to bring about 24 voluntary emission reduction projects with a trading volume of 450 thousand tons.

### 3.3 Challenges of Carbon Finance Development in PRC

#### 3.3.1 PRC still needs to develop a National Carbon Market

Currently, PRC only gets its limited experience with the carbon market through two ways. The first one is to participate in international carbon market through CDM as the host country, and sell CERs to the developed countries to help them meet their emission reduction obligations under Kyoto Protocol. The second one is the voluntary emissions reduction trading. Enterprises voluntarily buy carbon offsetting credits of offset the carbon emissions produced by their own production and business activities, driven by the need to fulfill corporate social responsibilities or promote public image. Only in 2011, PRC decided to establish its own domestic carbon market, starting from seven pilots programs. Preparatory work for the launching of the pilots is still under way.

Due to limited experience with the carbon market, public awareness to the concept of carbon market in PRC is weak. Enterprises normally mistakenly think that a domestic carbon market equals to a CDM Market. This is due to the fact that PRC mainly gets its experience with the carbon market from CDM and about 90% of PRC's CDM projects have been sold to international buyers. Voluntary carbon trading market is emerging in PRC, but it is still a very small and immature market. What's more, due
to lack of knowledge in carbon market, including the project based trading process and strategic positions, only a few commercial banks get involved in carbon finance and relevant financial activities, with few other Chinese financial institution participants.

Taking PRC as a whole, the invisible hand of market rarely play a role in addressing environmental problems such as energy conservation and emissions reduction, and its financial entities, such as investment banks, private equity funds, exchanges, etc., are not really participators. Due to the current state of the domestic carbon market and the lack of experience of the government, enterprises and financial institutions, PRC faces a great challenge in building its carbon finance system based on the carbon market. The future carbon market in PRC will directly depend on the performance and experiences of pilot projects. There is still a long way to go in developing a national unified carbon market in PRC.

Based on international experience, the development of carbon finance cannot separate from a mature carbon market. So the construction and development of a national carbon trading market in PRC is the precondition for carbon finance development.

3.3.2 The Domestic Financial System is yet to develop

The financial system in PRC is not mature. The development of carbon finance is inevitably based on the financial system, and a wide range of financial instruments and derivatives are needed in the carbon finance so as to develop a complete financial environment. But the development of carbon finance in PRC is especially blocked by insufficient innovation and rigid supervision of the Chinese financial system.

PRC seems to be a financial powerhouse in terms of "hardware", such as its capital strength, the number of financial institutions and practitioners, its foreign currency reserve etc. However, when referring to financial innovation, the development level of financial system, financial institutions governance mechanism, financial social
environment, financial supervision capacity, degree of financial internationalization and the financial talents allocation, PRC is still far from a "financial powerhouse". PRC is especially short of financial innovation which can promote the healthy and rapid development of the financial sector and the economy. Financial innovation is closely linked to the demand of the economic development, the ever-changing external environment and its own advantages, in order to promote the optimal allocation of financial resources and enhance the core competitiveness of financial institutions. However, PRC's current financial institution system is dominated primarily by large financial institutions, large and all-inclusive, making it difficult to response timely to the financial services in emerging industries like carbon trading, which are flexible, diverse and constantly changing. In addition, the financial supervision in every country has somehow been intensified since the recent global financial crisis, which also constrains the financial innovation in reality.

Chapter 4. SWOT Analysis of Developing Beijing into Carbon Finance Center

The SWOT analysis method is a feasibility analysis method conducted on the base of the established international condition. This approach is intended to be used to study the feasibility of developing Beijing into a carbon finance center. The words of SWOT represent Strength, Weakness, Opportunity and Threat, respectively. The summary of SWOT analysis of building Beijing into a carbon finance center can be made based on the above mentioned current status and future potential and challenges.

- **Strengths**

Located at the joint of Northeast Asia and Southeast Asia, the vital core of Pacific Economic Rim, and the center of Bohai Economic Rim, Beijing enjoys a unique and favorable geographical position with convenient transportation and strong financial trading demand derived from commercial trade, a sound environment for Beijing to
building up a financial center.

As PRC’s capital, Beijing gathers all macro-control departments, financial regulatory departments and headquarters of major domestic financial institutions and has become an indisputable national financial policy making and macro-control center, funds clearing center, financial R&D center and information release center. It pools more than 80% of PRC’s banking funds and more than 70% of PRC’s insurance premiums and exerts capital polymerization effect.

Based on maintaining the current economic development status and policy continuity, Beijing can have further optimized finance development environment, improved regulatory system. And because of these advantages, more and more financial institutions are intended to gather in Beijing. Beijing’s attraction for financial institutions will be increased greatly when its financial organization system becomes more concentrated and its financial competitiveness rises steadily.

Compared with other potential carbon finance center competitors, Beijing has the most competitive advantage that it is the city gathering the most carbon market institutions in PRC, including all stakeholders on the carbon market, e.g., governmental regulatory departments, exchanges, sellers, buyers, intermediaries and the financial institutions. Beijing is now the biggest home to CDM carbon assets and attracts numerous carbon assets buyers as numerous worldly known carbon consulting companies and DOEs to set up their branches in Beijing.

Beijing municipal government also attaches great importance to make Beijing become the international carbon finance center. Generally speaking, concentrating the social resources and giving priority to ensure the realization of the development plan will become fundamental guarantee for Beijing’s carbon finance development.

- **Weaknesses**

To be the national carbon finance center, Beijing has three main weaknesses.

(I) Beijing has a backward and incomplete financial market system
Some national financial administrations, the headquarters of some national banks and non-bank financial institutions concentrate on the financial street of Beijing, however, it does not have complete range of financial institutions, and the financial street or even the whole Beijing does not have any national exchange institution (such as securities exchange, futures exchange and gold exchange). Beijing focuses on the monetary market and features the trend of “hollow-ization in finance”. Therefore, strictly speaking, Beijing is not a modern financial center. As a consequence of the deficiency of an exchange, Beijing lacks financial instruments and products to increase the capital liquidity of the financial market, the overall function of the financial market cannot be given into full play. Beijing is inferior to Shanghai and Shenzhen in terms of the capacity of resource allocation, hindering the development and concentration of the financial industry in Beijing and seriously restricting the establishment of a carbon finance center in Beijing.

(II) Coexistence of two levels of governments will block policy implantation

The central government is located at the administrative area of the Beijing municipal government. In contrast to Shanghai and Shenzhen, Beijing is more possible the conservative policies and measures for developing the carbon trading mechanism, carbon market and carbon finance, because the central government will provide more suggestions to Beijing municipal government. In the long run, this will exert certain adverse influence over the in-depth development of a national carbon finance center in Beijing.

(III) Weak technical guarantee capacity for carbon trading

The establishment of a carbon finance center requires a mature carbon emission trading market. As a type of contract trading, carbon trading is to trade virtue emission reductions. So, the truthfulness and reliability of carbon trading subject matter is of vital importance for the stable operation of the carbon trading market. Accordingly, Beijing must establish a complete system, namely a “Measurable, Reportable and Verifiable (MRV) system” to guarantee the compliance and lawfulness of the carbon
finance market. However, except PRC’s large enterprises such as large state-owned energy enterprises, many domestic potential carbon market participants are weak to build a MRV system. To establish a national carbon finance center, Beijing should devote much effort to promote the establishment of a MVR system.

Besides, a completed trading system, a registration system and a submission system must be established for the operation of a carbon trading system, and the three closely linked systems, as a unified technical platform, is necessary for a carbon finance center. Although Beijing has established the Beijing Environment Exchange, the center for future carbon emission right trading, relevant technical platforms have not been efficiently set up. It should be emphasized that only on the basis of technical guarantee can the carbon trading market be sufficiently developed thus to promote the building of a carbon finance center.

- Opportunities

Beijing municipal government has set forth the administrative vision and direction to build up a “Green Beijing” and world city. Therefore, to develop low carbon industries and build up the national carbon finance center are the keys to the achievement of above mentioned objectives of Beijing. In traditional finance, PRC is a late starter that far behind other countries and regions with developed financial industry, and has little say since the rules of traditional financial industry is basically made by major western countries with developed financial industry. The carbon finance is a new immerging industry that integrated low carbon development, low carbon innovation and financial industry. In the field of carbon finance, countries with developed financial industry have not taken the significant lead position compared to PRC, and thus if PRC can establish carbon finance center as quick as possible, it will be very helpful to win a discourse power in global negotiations on climate change and low carbon development.

Moreover, the development thought of building Beijing into the carbon finance center can avoid the repeated homogeneity competition with Shanghai-- the traditional
Financial center. Building up a national carbon finance center can achieve the purpose that make full use of financial resources for promoting the low carbon economic development and that foster new economic growth points in Beijing. Also, the process of building up the carbon finance center can establish the linkage between the domestic finance market and international mainstream financial markets, it is able to achieve its objective of building up an international city in a short time.

- Threaten (Challenges)

The external challenges for Beijing to the establishment of carbon finance center come from the competition from other PRC’s financial center cities, such as Shanghai, Shenzhen and Guangzhou. Among them, Shanghai, the traditional financial center city, is especially competitive. According to the strategy approved by the Party Central Committee and the State Council, Shanghai is selected to be an international finance center; hence, the national government will lend more political support to Shanghai. This political factor makes Beijing more passive in future innovation and development in the carbon finance sector than Shanghai. In addition, at present, Shanghai is also listed as a pilot region for carbon emission right trading by the national government, and Shanghai municipal government also pay great attention to the development of carbon finance. To become the national carbon finance center, Beijing should properly address the competition challenge from Shanghai during the development.

Some other uncertain mainly arises from the political status of Beijing. As the capital of PRC, Beijing must maintain the stability of economy and society, so the difficulty of Beijing in developing highly risky industry are more evident. In this respect, the biggest obstacle to establish a carbon finance center in Beijing is the worry of an unstable society. Beijing almost has no precedent on foretasting financial and economic reform or innovation. While Shanghai and Shenzhen, as the traditional financial centers and special economic zones respectively, always take precedence of relaxation and freedom by national policy. So Beijing has lagged behind in the opening of financial industry all along. Specifically, since the reform and open up,
Shanghai has become the forerunner of pilot reform in PRC’s securities and futures market. Shanghai’s shareholding system reform, including its futures market, preceded the establishment of the Securities Regulatory Commission. Hence, Shanghai developed into one of the most developed financial market. PRC’s markets of stocks, foreign exchange, futures, gold and derivatives are all concentrated in Shanghai.

For a financial center, the freedom and openness of financial market are of great significance. At present, Beijing’s financial market is lack of freedom and openness. Moreover, it is subject to financial regulations, so the financial activities and resources in Beijing poor in liquidity and cannot accumulate talents in accordance with the market rules, which are fairly unfavorable for Beijing to become into a modern financial center.

Chapter 5. Road Map for Beijing to Develop into a Carbon Finance Center

Although Beijing has clearly demonstrated its intention to promote carbon finance, actually it is still yet to formulate a clear strategy and corresponding implementation plan. Based on the current status, Beijing is in urgent need to formulate a practical and operable roadmap for developing a carbon finance center.

At present, on top of encouraging seven pilots to test ETS designing and implementation, the Chinese government is also actively making efforts in laying ground for the establishment of a national unified ETS. Different pilots have made different design choices from others, the relationship between the local/regional pilots and the looming national system under development is not yet established, nor is the process that may be necessary to transition the pilots in one way or another into such a national system. However, the a preliminary timeline set by the national government for the establishment of the national unified ETS is during the 13th Five Year Plan (FYP) period, namely from 2016 to 2020. In comparison with Shanghai and Shenzhen,
Beijing lags behind in terms of the financial industry basis, but Beijing’s advantage lies in its carbon market foundation. Beijing is the center of the Chinese CDM market and currently the national authority and major research institutions, experts and service industries relating to carbon market are all based in Beijing. This gives Beijing unmatchable position in developing carbon market compared to other pilot localities. To consolidate and secure a key role in the future national carbon market, Beijing should further promote its pilot ETS and try to develop itself into a National Carbon Trading Center (NCTC) which dominates the share of carbon trading in the PRC.

Then, Beijing should aim to develop itself from a carbon trading center into a carbon finance center, and promoting the overall finance industry level during the processes of building carbon finance center. Compare with the NCTP, diversified carbon products will be traded in the carbon finance center. Key products will be carbon derivatives, such as carbon futures and options.

Based on the “Twelfth Five Year Plan” of Beijing, a proposal on the roadmap for the development of international carbon finance center in Beijing are provided below. The roadmap is divided into three major stages. The respective criteria for setting the stages and the specific targets are described below.

5.1 Stage One: Building a National Carbon Trading Center

5.1.1 The Evolving Features of National Carbon Trading Center

In 2011, Beijing was approved as one of the seven regions for the pilot work of carbon trading by the national government. Soon afterwards, Beijing was fully engaged in formulating implementation program and system designing of the pilot ETS. Up till now, Beijing is in the final stage of preparatory working, including infrastructure building and system designing. Beijing’s pilot carbon trading is planned to be officially kicked off in the end of 2013.
From the strategic perspective, the purpose for the establishment of the current seven pilot carbon trading mechanism is to grope innovation and accumulate experiences for the establishment of a national carbon market. During the 13th FYP period, PRC may launch the national carbon market based on the experiences and development of pilot ETS. It is highly possible that some of the seven pilot localities could be selected as national trading platforms, which is a key step for the development of a national carbon trading center.

According to the current geographical distribution of the 7 pilots for carbon trading, Beijing and Tianjin are located in North PRC, Chongqing in West PRC, Shanghai and Hubei Province in Central and East and Guangdong and Shenzhen in South PRC. Geographically, the areas covered by the seven pilots include three major economic circles4, which also demonstrate different level of economic development. In the future, the central government is very likely to select two or three pilot provinces or cities as the national carbon trading centers, considering their regional economic development level and the maturity of their pilot carbon market and the supporting infrastructure, especially the carbon trading platform.

5.1.2 Implementation Plan

During this Stage, Beijing’s target is to build and improve its carbon trading pilot step by step. The aim is developing its carbon trading pilot into a national carbon trading center, with the key task of establishing a national carbon exchange in Beijing.

The main challenge during this stage is to develop Beijing’s carbon trading pilot in the broad context of the evolvement of the national carbon market. The system designing and relevant carbon market infrastructure building are the major preparatory work during pilot phase. Due to the lack of knowledge and experience, mistakes could

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4 Three major economic circles in PRC refer to Pearl River Delta economic circles, Yangtze River Delta economic circles and Jing-Jin-Tang economic circles.
happen, and a process of learning by doing is inevitable. While ensuring the smooth and successful operation of the pilot ETS is of fundamental importance, Beijing should move beyond “learning by doing” and prepare for the future national carbon market, especially clearing the way for Beijing to become the national carbon trading center.

Pilot ETS implementation could give Beijing the opportunity to establish a carbon trading platform and sound carbon market “ecosystem” which is attractive enough to participant outside Beijing. Once a national carbon market is established and policy is ready, the pilot carbon market infrastructure and trading platform in Beijing would be competitiveness enough to function as a national carbon trading center.

5.1.3 Major Constraints

As the carbon trading center is normally defined to be a place where a dominant share of the trading takes place, if Beijing is to become a national carbon trading center, it must take up a substantial share of carbon trading in the future national carbon market. The major constraints for Beijing to build the national carbon trading center is the limited size of its pilot carbon market and consequently limited trading volume in the pilot phase.

The major constraints for Beijing to build the national carbon trading center is the limited size of its pilot carbon market and consequently limited trading volume in the pilot phase, since trading volume is one of the indicators of a carbon trading center.

The dominance of service industry in the overall economic structure means higher level of economy and creates a better environment for the development of carbon finance services. However, compared to other pilot regions where the energy intensive sectors take a larger portion in the economic structure, the overall emission volume of covered entities in Beijing's pilot ETS might be smaller. Moreover, the carbon
emission reduction potential in the service sector is also relatively small compared to energy intensive sectors. For these reasons, the trading volume and market liquidity of the Beijing pilot carbon market might be limited.

However, Shanghai and Shenzhen might face similar problems. And London is also a city with an economy dominated by service sector. London’s experiences show that, the critical factor making a carbon finance center is not the emission volume of the city itself, but rather the level of infrastructures, quality of services and aggregation of relevant stakeholders. The carbon products traded in the carbon trading center normally comes from a much wider range of geographical areas.

So Beijing needs to look beyond its pilot carbon market, take full advantages of its solid carbon market foundation, and continue to enhance market infrastructure and promoting and improving carbon market related services. In these areas, Beijing is facing competition from Shanghai and Shenzhen.

To summarize, during the stage of developing into a national carbon trading center, the target for Beijing is to strive for the successful implantation of its pilot ETS, and based on its experiences, to develop mature market infrastructure and incubate a competitive carbon market service sector, laying the foundation for its development into a National Carbon Trading Center.

5.2 Stage Two: Building a National Carbon Finance Center

5.2.1 The Features of Building a National Carbon Finance Center

At this stage, with the growing maturity of national carbon trading market, the carbon finance activities would become much dynamic. Based on the completion of national carbon trading Center, Beijing shall build into the national carbon finance center in two perspectives: on one hand, Beijing shall build and advance its carbon derivative market, on the other hand to promote voluntary emission reduction market and
deployment of low carbon technology through low carbon loan and other measures. Meanwhile, talent pool and regulations for carbon finance service should be further developed. Overall, the main focus of this stage is extending the carbon market via the assistant of carbon finance service.

In developing into a national carbon finance center, Beijing shall have the capacity to levy, absorb and drive capital from around the country to invest in green economy, specifically promoting low carbon technology, with its rigorous carbon finance market underpinned by a robust carbon market. Consequently, financial capitals would also directly or indirectly invest in the projects generating carbon assets. Then the certified emission reductions generated from these projects can enter the carbon market in the form of carbon futures or options. As indicated, building Beijing into a national carbon finance center shall start from an active carbon market, and boost financial services based upon it. Finally establish a relatively complete and effective carbon finance system in Beijing at this stage.

5.2.2 Implementation Plan and Major Constraints

Based on the national carbon trading Center, to build Beijing into the national carbon finance center requires efforts on many aspects. Taking this one step further, the basic elements of carbon finance, including instrument and service, participant and market circumstances, shall be identified and then developed gradually. First, in order to expand transaction scope, it is recommended to develop carbon finance derivative trading. The carbon derivative is a major key to establishing carbon finance center. The process includes the obtaining state permit and license for conducting carbon derivative service, and the development of trading regulation and products. How to get the license in conducting carbon derivative service and developing carbon derivative products are the key task and major constraint for Beijing during this stage.

Providing low carbon loan to support voluntary emission reduction projects is also
one effective supplementary means to boost carbon trading. Since a substantial portion of carbon asset and carbon derivatives are from certified emission reduction credits, it is a good way to invigorate carbon market through introducing more offset projects and their credits. Meanwhile, low carbon loan is the most traditional and most direction approach for commercial banks and enterprises to participate in carbon finance. The development of low carbon loan facilitates wide participation of carbon finance. Beijing could implement low carbon loan by providing subsidy, designing low carbon loan measures and improving risk containment mechanism. Currently, some banks have already begun to practice low carbon loan while the relative financial regulation or guidance is still in absence.

To summarize, the target of this stage is developing Beijing into the national carbon finance center. In achieving this goal, Beijing government shall focus on applying the national license to conduct carbon derivative trading, boosting carbon derivative market and supporting voluntary emission reduction projects.

5.3 Stage Three: Building an International Carbon Finance Center

5.3.1 The Features of Building an International Carbon Finance Center

The objective of this stage is to build Beijing into an international carbon finance center. This stage is set based on the following situations: PRC’s domestic carbon market had been well developed for a relative long period, basic infrastructures are relatively mature, the carbon market is liquid and stable, and operates smoothly and effectively. Beijing, as the national carbon finance center, possesses the potential for participating in international carbon market competition. The main target of this stage is to further boost the carbon finance in Beijing, improve market infrastructure and attract international financial professionals and capitals, and finally develop Beijing.
Currently, after the launch of the European Union’s Emission trading system in 2005, more and more countries and sub-national regions are building their domestic carbon markets. For example carbon markets of New Zealand, Australia and California are put into operation one after another in recently years. The republic of Korea had already passed legislation, and its domestic carbon market is expected to be formally launched as early as 2015. The government of Japan is still considering establishing a national emission trading scheme, although parliament had once vetoed such legislation earlier. In the near future, with the establishment and development of those national and sub-national carbon markets, the international carbon market which used to be dominated by Europe is likely to be changed and the carbon market of Asia Pacific may bloom and grow. Against this background, Beijing is expected to be part of the Asia Pacific regional carbon market, and has the potential to rise in the field of financial service for international carbon trading.

5.3.2 Implementation Plan

To build Beijing into international carbon finance center is based on the successful implementation of the previous two objectives in stage one and two (to build Beijing into a national carbon trading Center and to build Beijing into a national carbon finance center). Only after the successful achievement of these two previous objectives, can Beijing be qualified to develop into an international carbon finance center. In the more detailed implementation plan, we suggest that Beijing shall lay on its foundation of a national carbon finance center, and to extend its existing advantages, further work on the construction of basic finance infrastructure and talent base to reach international level.

In order to achieve this, the overall implementation plan includes: first, Beijing should further continuously improve its financial industry, especially the carbon finance
infrastructure. The Beijing government shall also provide policy support and funding to boost the development of finance industry. Second, on the basis of continued growing and strengthening of PRC’s carbon market, the government should look beyond PRC and try to link with other comparable carbon markets to expand its influence. Meanwhile, Beijing government shall support the fundamental research for carbon finance innovation and make efforts to train and introduce senior management and highly-skilled personnel in carbon finance industry.

5.3.3 Major Constraints

In the race for becoming international carbon finance center, Beijing’s competitors would not be confined to traditional carbon finance centers like London and New York, but also cities from Asia Pacific region, in particular Hong Kong and Singapore. Both of them have the upper hand in terms of geographical positions, as they are also close to PRC, which facilitate the timely collection of carbon trading policies and market information. Numerous excellent and experienced financial professionals also gather in Hong Kong and Singapore. Meanwhile, Hong Kong and Singapore are located at the core of the Asia Pacific region, and enjoy a greater advantage than Beijing in connecting towards Australia, the USA and Japan. In addition, Hong Kong and Singapore have already become the international finance centers and have built their sound financial bases. So in this international race, Beijing’s competition with those international finance centers would never be easy. To develop into an international finance center with competitive edge, Beijing needs to plunge in all the way. In practical term, Beijing shall identify its gap with those international finance centers, and make great efforts in building financial infrastructure and associated facilities.

To summarize, the core target of this stage is to develop Beijing into an international carbon finance center.
Chapter 6. Policy Recommendations for Developing Beijing into a Carbon Finance Center

In terms of the overall approach, the task is threefold: first, Beijing needs to draw a specific strategic plan for developing carbon finance; then, to establish a harmonized and efficient management mechanism for administration, and finally to study and prepare a medium and long-term development plan for implementation. Meanwhile, Beijing needs to identify and assign the key tasks in developing carbon finance to departments at different levels, based on their division of labor and assigned responsibilities. These key tasks include how to strive for a national carbon trading center, how to further expand to carbon finance center featured with active derivative trading and related services, and how to get access to the international carbon market and secure a position in it.

6.1 Policy Recommendations for Beijing: From Pilot to a National Carbon Trading Center

6.1.1 Improve the Management and Maintenance Level of Carbon Market Infrastructure

The carbon market infrastructure is a key factor underpinning the development of a robust carbon market. It mainly includes the registry system, the emissions reporting system, and the trading system.

The registry system is the electronic tool to facilitate the government to manage carbon allowances, specifically allocation, holding, transferring, surrendering and cancelling of allowances, through accounts held by various participants. The registry is the backbone of the infrastructure, which makes the intangible allowances visible, and ensures the credibility and security of the trading. Emissions reporting system is a tool to facilitate enterprises to report emission data in an efficient way, and also
enables the government to improve data management and evaluate compliance. Trading system, built within the exchanges or trading platform, is the facility which supports the matching of sellers to buyers and automatic transactions according to certain fixed trading rules set by the exchanges and approved by the regulatory authority. Through the trading system, transactions are conducted in an efficient way, and information relating to prices and transactions are open to the public.

These three elements of the infrastructure are connected to each other in an integrated manner. The reliability, safety and stability of these elements are the physical foundation for the successful development of carbon trading market. Any loophole in infrastructure might lead to very serious problems. For example, in the EU carbon trading scheme, the registry system was once broke-in by a hacker to steal the carbon allowance, and this caused the temporarily closing of the spot market. A reliable infrastructure system can avoid unnecessary losses and boost practitioners’ confidence.

Aiming to become the national carbon trading center, it is very essential for Beijing to build very high standard carbon market infrastructure in the beginning. It shall not be limited to satisfy Beijing pilot’s needs, but also strive to meet the requirements of serving as national carbon trading center.

Currently, the infrastructure of the Beijing pilot ETS is still in its infant stage. Therefore, before the official launching of the pilot carbon trading market, the authority took charge of the infrastructure needs to organize experts in relevant fields to test the abovementioned systems and make ensure they can function in a proper way. Due to limited experience in running and maintaining high quality infrastructure, emergency plans to cope potential loopholes or problems are also needed.

In the meantime, the early operation of the infrastructure would also give important lessons and experiences, and the authority need to set a review process to capture experiences and make improvements. The early stage of carbon trading is critical to test and improve the whole infrastructure. This whole process would probably involve
government administrative departments, covered enterprises, exchanges and other stakeholders, and could be costly. Budgetary supports for these activities need to be well planned in advance.

6.1.2 Build and Improve the Price Monitoring and Containment Mechanism

Carbon trading mechanism is a policy tool which functions in a specific external policy and economic environment. The smooth operation of the carbon market not only depends on the proper design of the mechanism itself, it is also vulnerable to external environments. As the market environment is complex and volatile, unexpected macro-economic situations or contradictory policies may undermine the foundation upon which the carbon market is built, and lead to abnormal fluctuations of the carbon price. This potential risk may be aggravated by the improper design due to lack of experiences. The abnormal fluctuations could seriously damage the steady and sound development of carbon market and market confidence.

Typical example is the current market situation of the EU ETS. The EU authority set the emissions cap for phased III based on a judgment that the EU economy continue to run smoothly. However, the unexpected economic crisis leads to reduced economic activity and also reduced emissions of covered enterprises. This lead to a surplus supply of emissions allowances of approximately 1 billion, and the surplus is still building up and could amount to 2 billion (equal to a whole year’s emissions of all the covered enterprises) by 2020, based on EU’s assessment. This oversupply caused carbon price drop to historic low level since 2008, and hampers enterprises to invest in green and low carbon technologies. The European Commission is currently struggling to forge out plans to solve this problem and boost the EU carbon market.

Based on the EU’s lessons, the designing of the carbon trading mechanism in a flexible way to incorporate potential external changes or ensure policy coherence is
important to safeguard the smooth operation and robust performance of a carbon trading market. This is normally reflected by a sound allowance price monitoring and containment mechanism.

So far, the priority for Beijing is the designing of basic elements, such as the carbon emission reporting and verification system, the emission allowance allocation plan, and the market supervision system, to ensure a prompt start of its pilot ETS. The carbon price monitoring and containment mechanism is still not on the priority list of the agenda. The capability to keep a stable and reasonable carbon price is very important for the establishment of a national carbon trading center. Therefore, Beijing needs to establish an effective price monitoring and containment mechanism from the very beginning and learn how to operate such a mechanism.

(I) Design and improve a stability mechanism

Price containment mechanism with a price floor and ceiling for carbon allowance is the key aspect of the stability mechanism. Besides, it also needs to establish a Margin Mechanism\(^5\) and the Largest Trading Volume Quota System\(^6\) for companies participating in the carbon trading. These systems will not only contribute to the price stability in the carbon market, but also to the accumulation of experiences for establishing a price containment mechanism for the carbon derivatives trading in the future.

(II) Study and establish an allowance reserve mechanism

In the allowance allocation plan, a certain percentage of allowances could be set aside and put in to a reserve administered by the authority for the purpose of balancing supply and demand. When the demand is strong and carbon price exceeds a certain reasonable level, the authority can choose to sell the reserved allowance at fixed price

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\(^5\) Margin mechanism means customers and Participants are required to deposit margins based on their open positions.

\(^6\) Largest Trading Volume Quota System means the maximum volume a trading participant could sell or buy in a specific trading day.
to increase supply and control the carbon price. When there is an over surplus of allowance in the market and the price is too low, the authority could choose to cancel a certain amount of surplus allowance, or to buy the surplus allowance from the market at a fixed price, so as to reduce the supply and stabilize the carbon price.

(III) Strengthen and ensure a fair market competition environment

If one or few enterprises hold enough power to dominate the market, it is likely for the enterprise to control the carbon price through influencing market supply and demand. Take EU ETS for instance, among the 11,500 enterprises covered in the first phase, the top 5 enterprises, which possess lion shares of the carbon allowance, are all power enterprises, with the percentage of their holding allowance to the total amount ranging from 1.6%--5.9%. As for Beijing, in the current stage, the number of covered enterprises is around 500, which is far less than that in the first phase of EU ETS. So the large-scale power and energy enterprises in Beijing could have a much higher percentage. Also, most of these enterprises are state-owned enterprises. As these giant enterprises may have the power to lobby and influence policy makers in the process of formulation and adoption of the allocation plans, it is very likely for them to have stronger market power than their EU counterparts.

To ensure the fair and effective operation of the carbon market, it is necessary for the government to establish a market supervision system to oversee the operation of the market, and prevent market abuse and distortion.

(IV) Properly raise the carbon market access threshold

The focus of policy makers during the early period of the carbon market is to maintain the stable operation of the whole mechanism. In this stage, the role of intermediary traders in the secondary market is suggested to be properly restricted in order to test market performance and avoid unnecessary market risks. The number of market speculators shall be reduced, which is very important for maintaining the market stability in the early stage.
6.1.3 Support the Development of Project-Based Voluntary Carbon Trading Market

As the service industry constitutes 70% of the industrial structure in Beijing, the scale of total carbon emissions of the covered enterprises and their allocated allowances might be relatively small due to the lack of carbon intensive sectors. So the trading volumes of the local emission allowances are not envisaged to be massive enough for Beijing to gain enough momentum to be the national carbon trading center. Drawing on London’s experiences, Beijing needs to enhance carbon market infrastructure and service quality to attract participants from outside Beijing to settle their transactions at the trading platform in Beijing (currently is PRC Beijing Environment Exchange, CBEEX).

Before the launching of national carbon market, according to respective trading rules, allowances in other pilot ETS can only be traded within each jurisdictions. However, offsetting credits from projects outside Beijing may be traded in Beijing, and this is what Beijing needs to promote in the pilot stage.

In 2012, the National Development and Reform Committee issued the Interim Measures for the Administration of Voluntary Greenhouse Gas Emission Reduction Trading, which provided policy framework and legal foundations for launching the project-based voluntary emission reduction trading market in PRC.

In terms of developing voluntary emission reduction market, in contrast with the pilot compliance carbon trading market, the project-based voluntary carbon emission reduction market in PRC is nation-wide. CCER is the kind offsetting credits which can be accepted by and traded in all the ETS pilots. It means enterprises in all

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7 This is the Decree promulgated by NDRC which is acting as basic law regulating the activities of voluntary emission trading.

8 According to NDRC’s Voluntary Greenhouse Gas Emissions Trading Interim Measures, legal entities could develop carbon reduction project to gain the PRC’s Certified Emissions Reduction (CCER), and CCER could be traded in all-across PRC.
provinces may freely choose their trading center. The service quality (including level of infrastructure and convenience for participants to do their business) and trading cost are key factors considered by enterprises when they choose voluntary emission trading center. For Beijing, the experiences of participation in the CDM in recent years have endowed it with unique advantages on carbon market service, which are not possessed by other pilot provinces and municipalities. Therefore, Beijing may strive to develop itself into the biggest voluntary emission reduction market.

If Beijing desires to shine out among all local carbon trading pilots to become an influential carbon trading center with distinctive advantages and then evolves into a state-approved national trading center, it is crucial for Beijing to actively promote the voluntary emission reduction trading market in Beijing, in order to secure a competitive position in the national carbon market during the pilot phase.

In this regard, Beijing needs to promote the construction of its carbon trading center by vigorously developing the voluntary emission reduction market, and also promote and support the development of carbon market service industry, so as to attract more market participants to choose Beijing as their trading platform. At the same time, it is also necessary for Beijing to cultivate a favorable development pattern, under which, the voluntary carbon emission reduction market and the carbon trading pilot may facilitate each other.

In our view, the Beijing voluntary emission reduction trading market may be promoted in the following four aspects.

(I) Provide preferential treatment including tax cut to voluntary emission reduction trading carried out within CBEEX. When a dominant share of voluntary emission reduction projects select CBEEX as the trading center, the scale of transaction volume in Beijing could be enlarged in a substantial way. Beijing needs to study the possibilities of formulating preferential policies, such as tax cut or return for voluntary emission reduction trading, to attract market participants across the country to choose Beijing as the trading center. At the same time, CBEEX also needs to
enhance capacity and ensure quality trading services at competitive cost.

(II) Establish Green Financing Channels for voluntary emission reduction projects. Beijing may, based on its social and economic development, select several types of proactive emission reduction projects, such as wind, solar, geothermal, biomass, which are expected to provide social and economic co-benefits, and encourage banks and other financial institutions to provide low-interest loans or other innovative means of project financing with the support of public finance, in order to boost the development of voluntary emission reduction projects. The conditions for supporting the projects are that project developers have to choose CBEEX as the trading platform of the CCER generated by their projects.

As the carbon market is mature, projects’ risks will be reduced with a stable carbon prices and returns to the carbon related projects will become more predictable. At this stage, banks and other financial institutions would have sufficient market incentives to invest in the carbon related projects without government preferential treatment.

(III) Accelerate the development of relevant standards and methodologies. Beijing takes the advantage of the knowledge center of carbon emission reduction standards and methodologies, and relevant government departments in Beijing may support CBEEX to organize experts to formulate relevant voluntary emission reduction standards and methodologies. This could give Beijing the necessary technical leverage to attract projects across the country to select CBEEX as the trading center.

(IV) Provide policy support to relevant participants of the project-based voluntary carbon emission reduction market. In recent years, the UN sponsored CDM has been widely recognized and carried out in PRC, which greatly boosted the development of

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9 There is no internationally agreed definition of green finance. The term describes a broad range of funding for Environment-friendly technologies, projects, industries or businesses. A more narrow definition of green finance Refers to environment-oriented financial products or services, such as loans, credit cards, insurances or bonds.
project based offsetting carbon market in PRC. Beijing, being as the Capital city of PRC, had eventually evolved into the trading center of CDM, based on its advantages to obtain experts and geological facilitation to process relevant commercial and administrative procedures. Currently, a great number of international carbon market participants, including sellers, buyers, intermediaries, consulting institutions and certification bodies, have already chosen Beijing as their seat of PRC office, which could significantly enhance the service level of the carbon market in Beijing. While participating in the voluntary emission reduction market, these institutions could play a positive role in accelerating the development and growth of the carbon trading pilot program in Beijing. Therefore, Beijing is advised to provide specific policy incentives to carbon market participants, such as tax cut and financing facilitation, to further attract more participants to settle down in Beijing. With more participants choose to settle down in Beijing, more carbon market service providers will also choose to start business in Beijing, and competition would enhance the capacity and quality service. In this way, a good market “ecosystem” could be built in Beijing, and based on this attractive market “ecosystem”, more and more participants would come to Beijing for carbon trading business.

6.1.4 Explore to Collaborate with Neighboring Provinces and Cities

The coverage of Carbon Emission Trading Scheme has a significant impact on the level and scale of the market. Generally, the more compliance enterprises were included in the scheme, the more abatement cost differences could occur in different enterprises. This could lead to more opportunity of carbon trading. Therefore, in order to fully develop and strengthen the carbon market of Beijing, it shall take every effort to create favorable conditions for the expansion of its market’s coverage.

Beijing is the center of the North PRC Bohai Economic Rim, and has been playing an outstanding role in leading the development of the regional economy by radiating its
influences in economy, technology, culture, etc. In building its carbon market, Beijing shall take full advantage of its economic leadership role and radiation effect, and actively seek cooperative carbon trade opportunities with the surrounding provinces/cities.

Currently, the idea of establishing carbon trade mechanisms has already been witnessed in the development plans of several provinces/cities within the Bohai Economic Rim (Tianjin excluded). This provides an opportunity for Beijing to seek collaborations with those provinces/cities, and help them establish their own carbon markets through cooperative capability building programs. When appropriate, carbon markets in Beijing and other provinces/cities can then be connected with each other, thus further expand the coverage of Beijing’s carbon market.

It is suggested that, in the current stage, Beijing should initiate to undertake the project “research on the mechanisms of carbon markets connection”, trying to explore the collaboration opportunities among the carbon markets of different regions.

6.1.5 Strengthen the Carbon Trading Capability Building of all Stakeholders

Concepts such as carbon trading mechanism, carbon market and carbon emission allowance are relatively new to governments, compliance enterprises and relevant other relevant stakeholders. During the early period of carbon trading, the government needs to invest resources to strengthen the training and capability building for all stakeholders and to enable them to have some appropriate understanding about carbon trading and then participate in the market actively. During the early period of its carbon trading Pilot, Beijing needs to consider, based on the participation approach of different stakeholders, commissioning professional institutes to provide tailor made training programmes to different personnel, including the designing and operation of carbon market, carbon trading rules and carbon assets management, etc. These
trainings may greatly boost the designing and implementation capability of Beijing carbon trading pilot.

6.2 Policy Recommendations for the Establishment of a National Carbon Finance Center

6.2.1 Complement of Relevant Laws, Regulations and Systems

The development of carbon finance needs innovative means to strengthen the link between financial innovation and emission trading. Policy signal and long term certainty is the key to unleash innovation from business and relevant stakeholders. Currently, there is a lack of rules and policy certainty for the development of carbon finance in PRC. This increase the policy risks and legal risks in carrying out carbon finance business and dampen the enthusiasm of potential market participants. Beijing’s target to develop into a carbon finance center cannot be achieved without a supportive policy environment.

Policy makers in PRC are expected to improve institutional and regulatory framework relating to carbon finance. PRC is determined, at the top political level, to pursue a green and low carbon development path. However, this political wish needs to have specific means of implementation. As a priority, the legislation of a climate change law is a key stepping stone for improving policy environment. A climate change law could pay the way for a national legislation on carbon market and other green policies. The Ministry of Finance and regulators such as the People’s Bank of PRC, PRC Securities Regulatory Commission (CSRC), PRC Bank Regulatory Commission (CBRC) and PRC Insurance Regulatory Commission (CIRC) are also encouraged to strengthen coordination, and formulate green tax, green loan, and other incentive instrument to support and encourage carbon finance business of banks, CDM developers, and exchanges etc. Also the laws and regulations concerning the
establishment of the exchanges and traditional financial service should also be reviewed, to ensure they are in line with the need to develop carbon finance in PRC.

6.2.2 Promoting Carbon Derivative Trading

Based on foreign experiences, a mature carbon trading market needs to be materialized and enriched by carbon derivative products trading, specifically futures and options trading, beyond spot trading. The establishment of a national carbon trading center in Beijing would enhance the capacity for the construction of the carbon derivative trading market.

(I) Establishment of future exchange. Currently in PRC, the options and futures products trading are seriously restricted. Only 4 exchanges (see Table 2) approved by the central government have the right for carrying out options and futures trading business. The CSRC is responsible for the approval and regulation of future exchanges. Therefore, the preliminary task for Beijing is to apply for the establishment of carbon futures exchange at CBEEX. Under the support of the Beijing Municipal Government, CBEEX shall make every effort and prepare fully to meet all the requirements of the CSRC for the application to be the first carbon trading center in PRC to have the license to carrying out carbon derivative trading business.

According to the Regulation on Administration of Futures Trading and the Regulations on the Administration of Futures Exchanges issued by the CSRC, the futures trading shall be carried out in futures exchanges or other exchanges permitted by the regulatory authority, namely CSRC. Currently, all the four futures exchanges approved by the CSRC are not carrying carbon futures or other derivative products trading business.

Table 3 Existing future exchanges and traded product in PRC

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Form</th>
<th>Traded product</th>
</tr>
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Zhengzhou Commodity Exchange
Zhengzhou Membership
Wheat (including superior strong-gluten wheat and ordinary wheat), cotton, sugar, PTA, rap oil, early indica rice, methyl alcohol, glass, rapeseed and rapeseed dregs.

Dalian Commodity Exchange
Dalian Membership
Corn, Soybean 1, Soybean 2, soybean meal, soy oil, palm oil, LLDPE, PVC and coke

Shanghai Futures Exchange
Shanghai Membership
Gold, silver, copper, aluminum, zinc, lead, threaded steel, wire, fuel oil and natural rubber.

PRC Financial Futures Exchange
Shanghai Membership
CSI 300 index futures

The Beijing municipal government and Beijing Municipal Bureau of Financial Work could assist CBEEX in obtaining the license of carbon derivative trading. The strength of support from the hosting local government could greatly increase the possibility of the establishment of carbon future exchange within CBEEX.

CBEEX has rich experience in the participation of carbon market compared to other carbon exchanges. CBEEX had launched PRC’s first voluntary emission reduction standard, the Panda Standard10, as early as 2009. CBEEX is also one of the earliest exchanges engaged in CDM trading service. However, due to the current regulatory system, CSRC strictly control the approval of futures exchanges, including carbon futures exchanges. The State Council issued two decisions in 2011 and 2012 on the restriction and strengthening regulation on the types of business exchanges are allowed to conduct. Under the current regulatory system of CSRC, CBEEX are not

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10 Panda standard is a voluntary emission reduction methodology, similar to relevant VCS standards. The emission reduction credits generated and measured under the Panda Standard could be traded on the voluntary carbon market.
allowed to operate any business which is under regulatory authority of CSRC, including carbon futures trading. If CBEEX want to be a trading platform operating carbon futures trading, it will have to get the approval from CSRC. In order to do this, CBEEX shall make full preparations, including recruiting more professional staffs and drawing up normative future trading rules, according to the regulatory requirements, notably the Regulation on Administration of Futures Trading and the Regulations on the Administration of Futures Exchanges.

(II) Design of standardized carbon trading products and developing carbon derivatives market

The designing of carbon futures trading mechanism and the development of carbon financial derivatives market are one of the most important parts of the task of building Beijing into a carbon finance center. The development of carbon financial derivatives market plays a vital role in the thriving of the carbon trading market. The supply and demand in the carbon market would be balanced and relevant carbon spot prices would be adjusted when the futures fully play its main functions, including hedging, price discovery and risk management. The scope and scale of the carbon financial derivatives trading are also important indexes of a carbon finance center.

Based on the experiences of foreign carbon financial derivatives and the domestic demand in the carbon market, Beijing could choose carbon futures and options as its first two derivatives. Futures trading are supposed to be the first choice, followed by options. The assets of carbon futures and options contracts are carbon allowances or certified emission reductions, which can also be transformed to standard contract like traditional futures and options contracts. In this sense, Beijing would attract carbon traders across the country or globally to do their business on the carbon trading center under CBEEX.

Regulations published by CSRC on the current financial products such as the Regulation on Administration of Futures Trading can be taken into reference when we design the Beijing trading center.

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For CBEEX, it needs to consider the following factors when trying to design its own business of carbon futures trading, before applying approval and license from CSRC.

The first is about the type of trading products. Carbon futures trading are normally taking the form of standardized futures contracts, which take carbon dioxide equivalent as the common measurement. The carbon emission allowance, CCER from domestic voluntary emission reduction projects, CER from CDM projects and forestry carbon sinks or credits are the subject matter of the futures trading.

The carbon futures contract may be delivered collectively on a monthly or quarterly basis, depending on the trading volume and range. The quoting unit is suggested to be Yuan (CNY)/ton (carbon dioxide equivalent). The basic trading unit is suggested to be 1000 ton carbon dioxide equivalent, which is the normal practice in the international carbon futures market, and the minimum price variation range is suggested to be within 0.01-0.05 CNY/ton.

The second is the trading mechanism. The carbon futures trading shall be conducted within the carbon futures exchange, taking the trading vehicle of the call auction mechanism. According to the domestic regulation on the futures exchanges and futures trading, the exchange shall adopt membership mechanism. At the same time the margin mechanism, daily no debt settlement, price limit, position limit, major client reporting, delivery, forced liquidation, information disclosure and other prevailing systems shall also be adopted.

The third is delivery terms. The emissions allowances futures contract should deliver carbon allowance which are converted based on the carbon dioxide equivalent and are approved by the registry system of national emission trading system. The CCER futures contract should deliver CCER issued by NDRC. The CER futures contract

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11 In finance, a futures contract (more colloquially, futures) is a standardized contract between two parties to buy or sell a specified asset of standardized quantity and quality for a price agreed upon today (the futures price or strike price) with delivery and payment occurring at a specified future date, the delivery date.

12 Where participants buy or sell units of a good, at a call auction, participants place orders to buy or sell units at certain buying or selling prices. Orders collected during a call auction are matched to form a contract. Call auction rules vary by auction.
should deliver CER certified by designated operational entity and issued by the U.N. CDM executive board. The forestry carbon sink futures contract should deliver forestry carbon sink certified by the forestry carbon sink regulators.

It is suggested that the carbon futures trading flow (showed Figure 7) shall be completed in the national emission trading system and the delivery shall be completed in the registry system, along with the settlement. The delivery date is suggested to be the last Monday of each delivery month (postponed accordingly if it comes across public holidays); the settlement price is suggested to be the price on the last trading day for the futures contract; and the last trading day is suggested to be the last trading day before the delivery day (postponed accordingly if it coincides with public holidays).

![Figure 7 carbon futures trading flow](image)

**6.2.3 Developing Low Carbon Loan**

The purpose of promoting low carbon loan in developing carbon finance is to leverage the participation of banks to assist the greenhouse gas emission control measures adopted by enterprises by providing low interest loans. Controlling GHG emissions cannot be achieved without new technologies or equipment, and cost is the typical barriers for adopting such measures. As the promotion of voluntary emission reduction market is an important part of the strategy to build a national carbon trading center in Beijing, the design of low carbon loan for voluntary emission reduction projects is also important. This is to help the companies or other stakeholders who are interested to build and operate emission reduction projects or buy energy efficiency facilities to overcome cash flow constraints.

Beijing may select some pilot banks to develop low carbon loan business. The selected banks could develop the business through multiple approaches, such as
applying low-carbon certification, low interest policies to low-carbon and new energy projects or designing credit system for low-carbon loan. In return, through developing low carbon loan business, banks could enhance their innovation capabilities, secure competitiveness and expand new areas of business opportunities. The coverage of the low carbon loan could be further expanded from new energy to forestry protection, organic agriculture, waste heat cogeneration and other fields, which are closely associated with emission trading.

The development of low carbon loan should be built on multiple aspects, including risk control and financial system improvement.

(I) Establishment of incentive mechanism

Beijing may consider providing financial support, or through other incentive mechanism, to reward financial institutions which participate in the low carbon loan programme. In designing interest, tax, subsidy or other incentive, mechanisms should be in place to ensure the provision of support to enterprises which had actively reduced their emissions. In order to develop a favorable market environment, punitive measure should also be designed to discourage emission intensive enterprises to keep the business as usual practice.

In addition to direct financial incentives, Beijing could also encourage the banks to take allowance or offsetting credits as mortgage or pledge by providing credible verification and endorsement. Enterprise could apply loans from the bank using allowance or carbon credits as guarantees, and banks could dispose and choose to sell the allowances or credits if the enterprise fails to return debt. In this way, the allowances or credits could be treated as carbon asset, and they could be further transferred as assets in financial activities. It is an effective way to boost the enthusiasm for enterprises to practice emission reduction project and widely participating in carbon finance. The establishment of a national carbon trading center indicates the amount of domestic carbon emission allowance and certified emission reduction in the PRC will be enlarge. The value of these carbon assets could be
gradually demonstrated and acknowledged with the advancement of carbon finance.

(II) Improvement of the credit rating and risk pre-warning mechanism

Compared with ordinary projects, the assessing and approval procedures for low carbon loan projects are relatively complex and time consuming. After loan is granted, the projects could encounter potential risks, such as policy change and management risks. Therefore, it is necessary to strengthen the credit rating and risk pre-warning mechanism.

Local regulators shall assist the pilot banks in implementing the credit rating. The investigation, assessment and verification of the credibility and capability to return debt of candidate enterprises should be carried out with scientific methods and standard procedures. All indexes and relevant parameters should be scientifically evaluated for future comparison and analysis. The insolvency and default risk should be assessed comprehensively and expressed intuitively.

Beijing Financial Bureau should join hands with relevant experts and research institutes, such as the Financial Research Center of Climate and Energy in the Central University of Finance and Economics, in exploring the management risks, financial risks, credit risks and fundamental risks of voluntary remission reduction projects. Referable comments as well as standardize credit procedures for such projects shall be established to increase the enthusiasm of banks for participation.

(III) Establishment of broad-based participation mechanism

Based on the expansion of low carbon loan business in the pilot banks, the Beijing government may seek to encourage and support other financial institutions to get involved in different stages or aspects of the business, such as serving as agents in selling, capital settlement, account transfer and deposit. Gradually, banks should provide sales, credit upgrading services and partial mortgage loans. Trust companies could provide trust investment management. Leasing companies should provide finance lease, and so on. Carbon finance participants could be increased to expand the field of low carbon loan and gradually bring momentum to evolve into full scale
carbon finance service. The key for the broad engagement

3.2.4 Infrastructure for Carbon Finance

In addition to carbon futures and low carbon loans, various supporting measures for the building of a carbon finance center also deserve special attention.

(I) Talent pool

In parallel with the building of a carbon finance center, Beijing should attach high importance to the improvement of professional competence and capacity of relevant stakeholders, including government officials and various market participants, through well drafted education and training strategy and programme. Basic financial knowledge, operation skills and relevant experience could be essential for the carbon finance participants. Lessons learned from the practice of carbon trading will assist the practitioners to be familiar with carbon futures and low carbon loan. These skilled staffs from financial institutions could bring and provide knowledge and service support to the establishment of carbon finance center.

Capacity building and training provided by higher education institutions or research centers need to be carried out gradually to improve the capabilities and competence of carbon finance participants, who are supposed to have a professional understanding of the carbon market in order to be able to combine the development of finance with emission trading market. These staff could be the sources of innovation when they are encouraged to ponder over the development of carbon finance.

Beijing shall also aspire to develop carbon finance research institutes to strengthen academic research. Carbon finance service is a prospective new industry. Its business model and development pattern is still not quite clear. Its development pattern shall be designed based on the consideration of macroeconomic and financial environments. The business procedures and products shall be reasonably designed. The basic principles of carbon finance regulation shall be formulated scientifically. All these important works could not be accomplished without continuous knowledge support from the academic research.
(II) Data quality and information sharing

Carbon finance is based on emission trading, which require data quality and transparency from enterprises. As carbon finance relies on a robust and credible carbon market, the regulatory authority would put more requirements for information sharing on carbon emission data. The carbon finance participants would also need more reliable information on the emission data, holding of allowances or the verified emission reduction credits to help them develop carbon finance products. Based on accurate and sufficient information, they can effectively assess the value for financing projects and design the contract terms.

The regulators should not only facilitate the improvement of the data collection system, but also timely publish market information to financial institutes. Based on the provided information, the financial institutes would carry out carbon finance business and then feedback to policy makers and the regulatory body for reference when they formulate or improve relevant policies. These policies could play a positive role in supporting the carbon finance industry.

(III) Supporting services

Along the development of carbon finance service, the auxiliary industries or brokering agencies which serve the carbon finance institutions are also expected to emerge, including law firms, accounting firms, investment consulting, credit rating, assets assessment and technical appraisal agencies. These auxiliary industries could further support the financial institutions and be conducive to the steady development of the carbon finance business.

The Beijing government should encourage the abovementioned consulting companies to get engaged in carbon finance business services, by providing preferential treatment such as fast track service for incorporation, tax cuts and other conveniences. They can help identify and utilize business opportunities in carbon finance, based on their advantages in industry research and knowledge. They may also serve as the think tank for the development of carbon finance and help minimize the transaction cost
and risks.

6.2.4 Advancing Infrastructure for Carbon Finance

In addition to carbon futures and low carbon loans, various supporting measures for the building of a carbon finance center also deserve special attention.

(I) Talent pool

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tank for the development of carbon finance and help minimize the transaction cost and risks.

6.3 Policy Recommendations for the Establishment of International Carbon Finance Center

6.3.1 Increase the Level of Financial Industry and Formulate Implementation Plan

Beijing government should support the development of financial and insurance industries as a long term development strategy, and to provide preferential local policies and tax incentives to encourage banks, insurance companies and other financial institutions at home and abroad to relocate their headquarters in Beijing, and also bring their clients to set foot in the area of carbon finance business. Meanwhile, Beijing government should encourage financial institutions to carry out business mix, and accordingly the government should adopt the financial-mixed supervision. Moreover, the Beijing government should actively striving for more preferential policies from the central government, to further expand its financial industry by carrying out new carbon finance businesses and innovating carbon finance products. These measures are the breakthroughs in building Beijing into an international carbon finance center.

It is also recommended that Beijing should encourage the establishment of powerful financial groups or encourage more financial groups to engage in carbon finance business. At the same time, Beijing needs to reduce intervention of the financial market by local governments, to prevent excessively regulation. Lastly, Beijing should also keep upgrading its financial infrastructure, including financial settlement system, trading system, custody system, credit information system and other fundamental financial service systems.
6.3.2 Seek International Cooperation and Build Advanced Carbon Trading Model

CBEEX is suggested to seek appropriate international cooperation with advanced carbon trading exchanges in Europe and North America. Specifically, CBEEX could seek international cooperation through signing memorandum of understanding, jointly establish branches in Beijing and develop carbon finance products, share carbon market information and data. Specifically through jointly establishing branches in Beijing with international carbon trading exchanges, CBEEX can draw international experiences and improve its competitiveness. At the same time, in cooperation with international carbon trading exchanges, CBEEX could also have the opportunity to build itself into the most advanced carbon trading center.

6.3.3 Looking Beyond PRC and Arrange a Strategic Layout

Beijing should aim to establish a carbon market linked to carbon markets in other developed countries and developing countries alike. Linking could help to increase efficiency and improve carbon trading volume and market liquidity, and promote the dynamics and prosperity of the carbon market.

CBEEX should also seek to establish branches worldwide, and these branches could be established in form of joint venture or sole proprietorship to enhance the influence of Beijing carbon market globally and strengthen the radiation effect of Beijing as a carbon finance center upon the rest of the world.

6.3.4 Enhance Research on Carbon Finance Innovation

Beijing municipal government should increase budget allocation to the research of carbon finance products and business innovation, as well as other carbon finance relevant topics, with the aim of enhance creativity and innovation for carbon finance business. This would help accelerate the development of Beijing’s carbon finance
industry and enhance its influence worldwide.

6.3.5 Improve the Cultivation and Import of Carbon Finance Talents

Beijing should strengthen its efforts to cultivate and import senior management and highly-skilled personnel in carbon finance, boost communication with other countries on finance education to unblock the channel between financial research and financial business. Meanwhile Beijing should increase the level of its financial professionals. One of the suggested measures is to provide favorable policies and taxes to attract outstanding senior management and highly-skilled personnel in carbon finance in PRC and abroad to choose to work and settle down in Beijing. Moreover, Beijing should strive to improve its environment quality to provide a more pleasant living environment.

6.3.6 Speed up the Improvement of Legal System and Financial Supervision

In terms of financial regulations, equal importance should be attached to compliance procedure and risk containment to strengthen capability of preventing and reducing financial risks, especially carbon finance risks. For building Beijing into an international carbon finance center, efforts should be made to formulate laws and regulations according to international standards, and based on which, to regulate the activities and competition of financial institutions in the market. Meanwhile, the credit rating system, management system and financial regulation standards should also be in line with international standard
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