

**Market Readiness Proposal (MRP):
Establishing a National Emissions Trading
Scheme in China**

National Development and Reform Commission, China

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General Information and Executive Summary

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2. Executive Summary

This *Market Readiness Proposal (MRP) for Establishing a National Emissions Trading Scheme in China*, submitted by National Development and Reform Commission (NDRC) to the Partnership for Market Readiness (PMR), provides background information and the initial thoughts of the Chinese Government on its proposed activities for establishing a national emissions trading scheme in China (China ETS), drawing on initial experience from the seven pilot emissions trading schemes in the country. The MRP is comprised of 8 Building Blocks (BB), covering both general and sector-specific issues.

Building Blocks 1 to 4 are developed mainly in accordance with the requirements of the Tool for the MRP – a guidance document endorsed by the PMR. Additional elements are included in the various chapters for the purpose of completeness. Additionally, two building blocks are developed to address the unique issues related to China's state-owner enterprises (Building Block 5) and power sector (Building Block 6). Building Block 7 deals with issues concerning organization, communication and

management. Building Block 8 is related to the overall budget of this proposal. The relationships between the Building Blocks are illustrated in figure 1.

A brief description of each building block is included below:

Building Block 1: Policy Background. This BB briefly introduces the policy context of establishing a China ETS. By 2020, China's GDP to CO2 emissions intensity will be decreased by 40-45%, in comparison to the 2005 level, and by 2015, China expects that the intensity will be decreased by 17%, relative to 2005. In order to achieve these targets, the Chinese Government will explore gradually introducing market-based policy instruments into its economy, including emissions trading schemes. In line with this policy, pilot emissions trading schemes are now under development in seven regions in China, i.e. Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong, Shenzhen. The economic and industrial structures, as well as resources endowments, are very different in these pilots, providing valuable experience to the development of a national scheme.

Building Block 2: Coverage. This BB presents the work related to coverage within China's ETS. The plan is to develop a national scheme, so the system will geographically cover the whole country. Specific sectors to be covered under the ETS, however, need to be identified -- taking into account experiences from both foreign and domestic schemes, current emissions, future emissions trends, mitigation potential and costs, data availability and reliability of relevant sectors in China. The outcomes under this Building Block will include a *Proposed Sector Inclusion Criteria and Plan for China's ETS*.

Building Block 3: Main "Readiness" Technical and Institutional Components. This BB addresses issues in relation to supporting infrastructure and capacity building for the development and operation of China's ETS, including a reliable data statistical system, effective program management system and necessary laws and/or regulations. Detailed work plans have been proposed to assess the current status and trends of

relevant technical and regulatory components in China, including the relevant work that has already been done at both the central and local levels. This will enable the identification of technical and regulatory gaps for the establishment of China's ETS as well as the development and implementation of a work plan to close the gap. Major outputs under this building block will include:

- *Proposal on Methods of Establishing Statistics System for China ETS,*
- *Proposal on the Management System of China ETS, and*
- *Proposal on Administrative Rules for China ETS.*

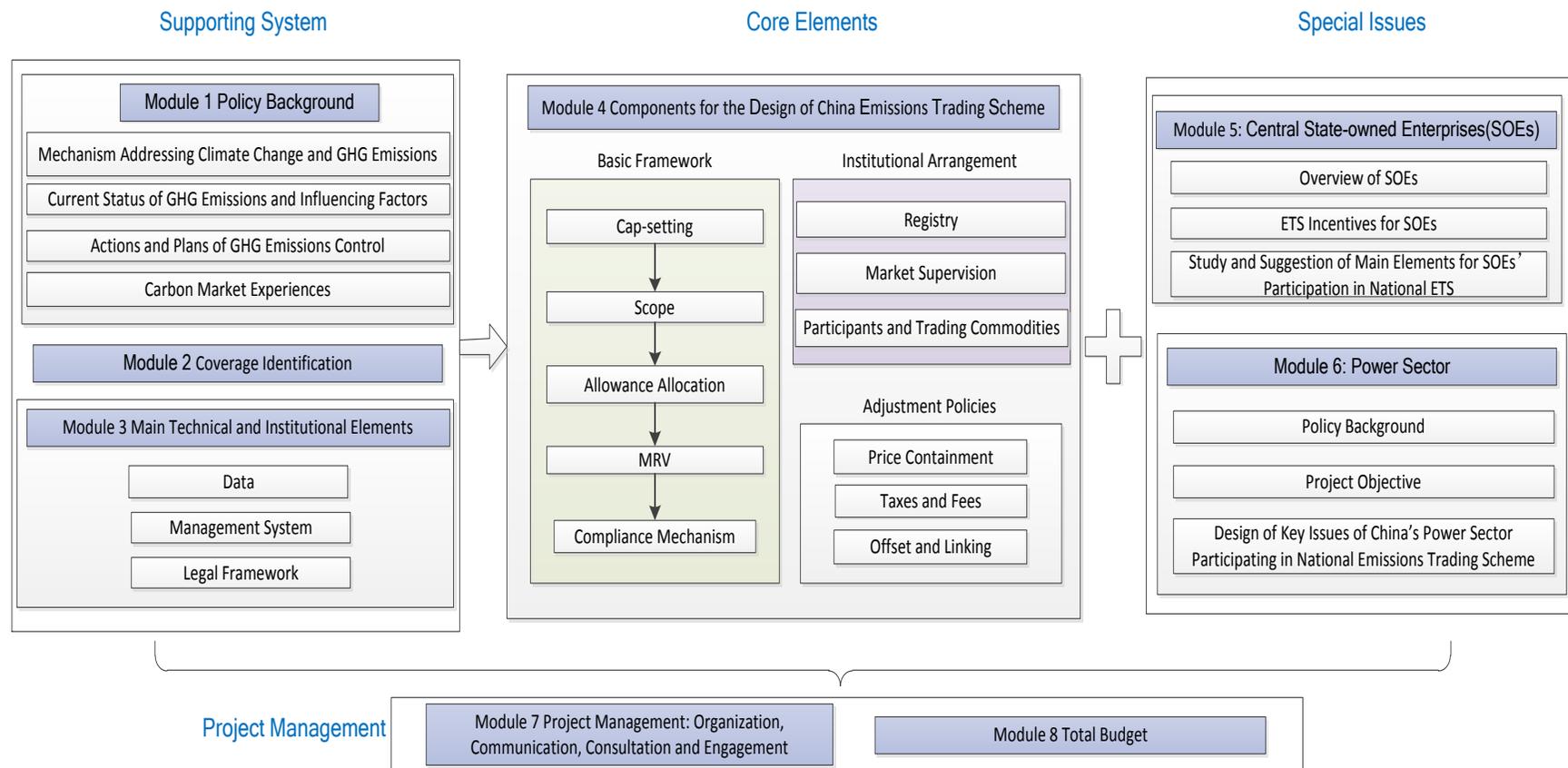


Figure 1: Relationships between MRP Building Blocks

Building Block 4, Components for the Design of China’s Emissions Trading Scheme. This is the core building block of the MRP. It presents ten issues related to the development of China’s ETS, i.e. scope, cap setting, allowance allocation, Monitoring, Reporting and Verification (MRV) Systems, registries, compliance mechanism, price containment mechanism, offset mechanism and scheme linking, market oversight, and participants and trading products.

The scope section analyzes the types of greenhouse gases and enterprises/installations to be covered by China’s ETS. Major outputs of this BB would include

- *Proposal of Greenhouse Gases and Enterprises/Installations Covered under China’s ETS*

The cap setting section proposes to: 1) conduct an in-depth analysis of the relationships and interactions between emissions trading and other policies such as mandatory energy conservation targets, mandatory carbon intensity reduction targets and Portfolio Standards; 2) consider both top-down and bottom-up approaches in cap setting; 3) consider the economic efficiency, environmental integrity and feasibility of different cap setting procedures and methodologies; 4) give special attention to the treatment of new entrants. The output of this section will be: *Proposed Cap Setting Program for China’s ETS*.

The allowance allocation section will produce *Guidance of Initial Allowance Allocation Methodology in China ETS*. To achieve this target, this section will study the allowance allocation methods adopted by ETSs, both at home and abroad, and analyze their major considerations and experiences. This section will also evaluate major challenges associated with allowance allocation approaches such as grandfathering and auctioning and benchmarking – keeping in mind the practical situation in China – and analyze, from an equity point of view, the impact of different allocation approaches on regions and sectors. Issues such as data basis, price formulation mechanism, stakeholder comments and transaction costs will also be fully taken into account.

The MRV section will develop *Proposed Sector-Specific Guidelines on Monitoring Emissions from Installations*, *Proposed Sector-Specific Guidelines on Reporting Emissions from Installations*, and *Proposed Sector-Specific Guidelines on Verification of Emissions from Installations*. These proposals will be based on current experiences, both domestically and internationally.

The registry section will focus on discussing the relations between setting up a national registry and local registries, with the aim of ensuring that the ETS can be smoothly transferred and implemented using limited resources rationally. The outcome of this section will be a *Proposed Framework Plan for a China National Registry*.

The compliance mechanism component proposes to identify key issues for a compliance mechanism for ETS, summarize the experience of China's pilot regions and relevant pollution-discharge right trade, and propose a compliance mechanism for China ETS including structural arrangement, compliance period, compliance rules and penalty mechanism etc. The output of this section will be a *Proposed Plan for the Compliance Mechanism for China ETS*.

The price containment mechanism section will analyze if it is necessary to implement a price containment mechanism in China ETS and study its feasibility. The output of this section will include a *Proposed Plan of Implementing a Price Containment Mechanism in China's ETS*.

The offset mechanism and scheme linking component will analyze the type, amount and source of offset credits that could be allowed within China's ETS for compliance, as well as the feasibility and basic requirements for China to link its emissions trading scheme with others. The output of this section will include a *Report on the Design of the Offset Mechanism for China's ETS* and a *Report on the Analysis of Basic Requirements for Linking China's ETS with Other Systems*.

The market oversight section will identify key issues relevant to ETS oversight and develop a *Proposed Market Oversight Plan on China's ETS* that will include content,

authorities, targets and rules of oversight.

The participants and trading products component will put forward policy recommendations on how domestic financial institutions would join the trading system, how to include carbon financial derivatives, their function and oversight system, and on what roles exchanges can play. The output of this section will include a report on *Policy Recommendation on the Treatment of Participants and Trading Products in China's ETS*.

Building Block 5: Key Study on the Participation of Central Government Managed State-owned Enterprises' (SOEs) in China ETS. This BB will study the special issues related to the participation of China's SOEs within the ETS and make suggestions on the design of China ETS related to SOEs. Proposed major outcomes include:

- *Report on the characteristics of SOEs and Incentives for participation in an ETS,*
- *Report on the Scope of Effective Involvement of SOEs in a national ETS,*
- *Report on Allowance Allocation for Effective Involvement of SOEs in a national ETS,*
- *Report on the MRV System for Effective Involvement of SOEs in a national ETS.*

Building Block 6: Analysis on Key Issues of China's Power Sector Participating in China's ETS. This BB proposes to study the features of China's power sector and explore special issues on the participation of China's power sector in the China ETS. Major outputs from this Building Block include:

- *Proposed Scope for the Power Sector in China's ETS,*
- *Proposed Cap Setting for the Power Sector in China's ETS,*
- *Proposed Allocation Plan for the Power Sector in China's ETS,*
- *Proposed MRV Scheme for the Power Sector in China's ETS,*

- *Proposed Coordination of Pricing and Dispatching Mechanisms within China's ETS for the Power Sector.*

Building Block 7: Project Management: Organization, Communication, Consultation and Engagement. This BB discusses measures to enhance coordination among relevant ministries at the central level, strengthen dialogue with local governments and key stakeholders, and outreach to the general public.

Building Block 8: Total Budget: This BB discusses budget issues. It is preliminarily estimated that more than 100 million USD is needed to establish China's ETS. Until now about \$66 million has been arranged by China's central and local governments, and \$12 million is supported by other donors. \$8 million will be applied from PMR. The preliminary consideration of allocations of PMR support is shown in the table below.

Research Description		Estimated cost (in US\$)			
		Year 1	Year 2	Year 3	Sub-Total
Building Block 2: Coverage Identification		300,000			300,000
Building Block 3: Main Technical and Institutional Elements	1. Data	300,000	200,000		500,000
	2. Management System	150,000			150,000
	3. Legal Framework	100,000	50,000		150,000
Building Block 4 Components for the design of China emissions trading scheme	1. Scope	300,000	200,000		500,000
	2. Cap Setting	400,000	300,000		700,000
	3. Allowance Allocation	400,000	300,000		700,000
	4. Monitoring, Reporting and Verification (MRV) System	500,000	500,000	230,000	1,230,000
	5. Registry		100,000	100,000	200,000
	6. Compliance Mechanism		100,000	100,000	200,000
	7. Price Containment Mechanism		100,000	100,000	200,000
	8. Offset Mechanism and Scheme Linking		100,000	100,000	200,000
	9. Market Oversight		100,000	100,000	200,000
	10. Participants and Trading Products	100,000	100,000		200,000
Building Block 5: Key Study on the Participation of Central Government Managed State-owned Enterprises' (SOEs) in China ETS		200,000	200,000	100,000	500,000
Building Block 6: Analysis on Key Issues of China's Power Sector Participating in China ETS		200,000	200,000	100,000	500,000
Building Block 7 Project Management,	Project coordinators	80,000	80,000	80,000	240,000
	Consultations/workshops Communications	70,000	550,000	710,000	1,330,000

Consultation and communication and other related activities					
Total		3,100,000	3,180,000	1,720,000	8,000,000

The allocation of funds is shown in the table below. Besides above mentioned, we are also implementing or planning to implement some bilateral cooperation projects on ETS with UK, Germany, Australia, Japan etc., with financial and technology support from those countries.

Funding Source	Total (USD)
National Government	\$66,000,000
Funding for seven pilot ETS in China	\$60,000,000
Establishment the disaster recovery system of China's ETS registry	\$5,000,000
Designing and establishment of the registry for China's voluntary emission reduction transaction	\$1,000,000
PMR	\$8,000,000
Other	\$11,700,000
Capacity building on ETS (from EU)	\$6,700,000
Designing and establishment of the registry for China emissions trading scheme (from Norway through UNDP)	\$2,900,000
Study on the accounting guidelines and reporting format of enterprises' GHG emissions in 6 sectors (from Norway through UNDP)	\$2,100,000
Grand Total	\$85,700,000

Building Block 1: Policy Background

1. Mechanism Addressing Climate Change and Greenhouse Gas Emissions

The Chinese government attaches great importance to the issue of climate change and has included addressing climate change as a major strategy into its planning for economic and social development. It has taken greenhouse gas (GHG) emissions control as an important measure in economic restructuring and growth pattern transformation and established the mechanism and policy target system for addressing climate change.

In terms of working mechanism, China has built and constantly improved its administrative system and working mechanism to address climate change, which features the unified leadership under the National Leading Group to Address Climate Change, administration by the National Development and Reform Commission (NDRC), division of work with separate responsibilities among relevant ministries and wide participation of various localities and sectors. China has also established its policy system based on *China's National Climate Change Program* and *The Outline of the Twelfth Five-Year Plan for National Economic and Social Development* (the 12th Five-Year Plan) and supported by special plans and work programs set by various sectors and specific areas. The 2009 Resolution of the Standing Committee of the National People's Congress on *Making Active Responses to Climate Change* requires to integrate enactment of climate change related laws into government's working plan. So far legislation on climate change has been kicked off.

As for greenhouse gas emissions control target, China has decided that by 2020 its carbon dioxide emissions per unit of GDP would be reduced by 40~45 percent as compared with that in 2005, and the proportion of non-fossil energy to the consumption of primary energy would be increased to 15 percent. These objectives have been

included as compulsory indicators in China's medium and long-term plan for national economic and social development. Relevant methods for domestic statistics, monitoring and reviewing emission reduction are to be developed. All the above actions point out the direction for addressing climate change in medium and long-term. The 12th Five-Year Plan further set two targets: by 2015, carbon dioxide emission per unit GDP would be reduced by 17 percent and the proportion of non-fossil energy to the consumption of primary energy would be increased to 11.4 percent.

To implement greenhouse gas emissions control targets set by the 12th Five-Year Plan, the State Council released the *Work Plan for Greenhouse Gas Emissions Control during the 12th Five-Year Plan Period* in December 2011, breaking the overall goal to local targets and making an overall arrangement for policies and measures of greenhouse gas emissions control during that period.

2. Current Status of GHG Emissions and Key Influencing Factors

As the world's largest developing country, with huge population and resource shortage, China faces a grave challenge in developing economy, eliminating poverty and improving people's livelihood. Due to its rapid economic growth, China has witnessed dramatic increase in greenhouse gas emissions the past three decades, and become one of the biggest emitters in terms of annual total emissions. According to China's *National Climate Change Program*, China's total GHG emissions in 2004 was about 6,100 million tCO₂e (5,600 million tons of net emissions), of which 5,050 million tons of CO₂, 720 million tCO₂e of CH₄ and 330 million tCO₂e of N₂O. Statistics from the International Energy Agency (IEA) indicates that the per capita CO₂ emissions from fossil fuel combustion in China were 5.13 tons in 2009, equivalent to only 52% of the average level in Organization for Economic Co-operation and Development (OECD) countries.

Along with the steady social and economic development, the emission intensity defined as the CO₂ emission per unit of GDP declined drastically. According to IEA, China's

emission intensity fell to 2.33 kgCO₂/US\$ (constant 2000 U.S. dollar) in 2009, as compared to 4.97 kgCO₂/US\$ in 1990, with a 53% decrease. For the same period, emission intensity of the world average dropped only 15% and that of the OECD countries dropped 25%.

However, in light of its national circumstances and development stage, the upward trend of energy consumption and GHG emissions of China cannot be changed fundamentally in short term. According to the *Initial National Communication on Climate Change of the People's Republic of China*, *National Climate Change Program* and *China's Policies and Actions for Addressing Climate Change White Paper*, factors influencing emissions in the future can be divided into five aspects.

(1) Population growth and accelerating urbanization

The population size is one of the key factors driving energy consumption and CO₂ emissions in future. Statistics from the *Second National Assessment Report on Climate Change* predicts that China's total population will reach 1.44 billion by 2020 and peak at about 1.47 billion in between 2030 and 2040, an increase of 130 million as compared to 2010 level of 1.34 billion. Calculated by per capita energy consumption of 2.42 tons of coal equivalent (tce) of 2010 level, the newly added energy consumption will reach 315 million tce. As a matter of fact, as urbanization is intensified, the per capita energy consumption will also continue to go up and the actual energy consumption produced by newly added population will probably exceed 315 million tce.

Urbanization is another major factor driving future GHG emission growth. Statistics from the *Second National Assessment Report on Climate Change* indicates that the urban population accounted for 46.59% of total population, 1.6% lower than the world average, 12% lower than the average of middle-income countries and 32% lower than the average of high-income countries. China still has a long way to go in urbanization. It is estimated that by 2020 the newly added urban residents migrated from rural areas will stand at about 200 million. At present, the average per capita energy consumption

of urban residents is two times that of rural residents. Calculated by the current level, the newly added urban population will need an extra 30 million tce by 2020.

In conclusion, due to the size of population and urbanization, CO₂ emissions of China will increase inevitably.

(2) Economic development

China has made great achievements in economic development in the past thirty years. According to NBS, the annual economic growth rate registered at 9% on average from 2000 to 2009. China's GDP reached 34.1 trillion Yuan in 2009, which is 3.4 times of 2000 level. Accompanied with fast-growing economy, CO₂ emissions also increased rapidly. IEA statistics indicates that the total CO₂ emissions from fossil fuel combustion were 6.8 billion tons in 2009, 2.2 times of 2000 level. Figure 1 shows that GDP and CO₂ emissions have grown at a similar rate (see Figure 1).

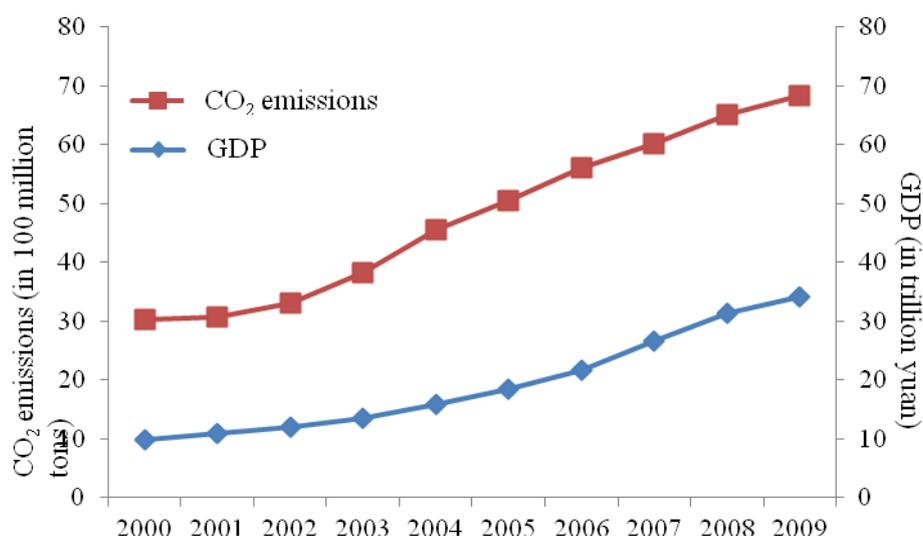


Figure 1 China's GDP and CO₂ emissions growth

Sources: CO₂ emissions data is from IEA report *Emissions from Fuel Combustion*; GDP data is from NBSC.

According to the 12th Five Year Plan, for the upcoming decade, China's economic growth rate will probably be kept at 7.5% annually, still much higher than other major

economies. However, as the *Second National Assessment Report on Climate Change* points out, the per capita GDP by 2020 will still be less than \$10,000. World experiences show that before per capita GDP reaching within the range of \$10,000 to \$15,000, per capita CO₂ emission growth rate normally follows the high growth rate of GDP, indicating continuous growth of energy consumption and CO₂ emissions.

(3) Growing energy consumption of households

The fast and stable economic and social development, satisfaction of essential needs and upgrading of consumption pattern have given new impetus for growth of energy consumption and GHG emissions as well. Since reform and opening up, China's economy has made rapid development, and people's living standard has been improved enormously. The private cars and household appliances are becoming more popular among the general public. Statistics show that ownership of automobiles and home appliances are increasing rapidly, but still lag behind that of developed countries. According to the World Bank statistics, in China every one thousand people owned 47 cars and the per capita electricity usage was 2,631 kWh in 2009, while in Japan, every one thousand people owned 589 cars and the per capita electricity usage was 7,819 kWh in 2009.

There is still room of improvement for the living standard of ordinary Chinese people. With further economic development, people's living standards will continue to improve. The total demand for energy will continue to grow with the increase in per capita household energy consumption. It's still very difficult to control household greenhouse gas emissions.

(4) Economic restructuring and technology advancement

Industrial structure is one of the major factors influencing future CO₂ emissions. As the secondary sector has been the main source of CO₂ emissions, the larger share it takes up, the bigger total emissions will be when GDP remains stable. China's current industrial structure is dominated by the secondary sector, which accounted for 47% of GDP in

2010. Since 2001, heavy industry featuring high emission intensity has been expanded tremendously and boosted the development of the secondary industry and the growth of CO₂ emissions.

The *Second National Assessment Report on Climate Change* predicts that China will be able to reduce the share of the secondary industry to 43% of GDP until 2030 and to 33% until 2050. At present, the Chinese economy is still on a high growth path to quadruple per capita GDP by 2020 as compared to 2000, an ambitious goal made in the Communist Party of China's (CPC) 16th National Congress. Even if the total GDP for the secondary industry can be reduced to 43% by 2020, the production volume of the secondary industry will be four times of that in 2000. That is to say, as the absolute size of the secondary industry continues to expand, emission reduction resulted from industrial restructuring is rather limited.

Technology advancement is one of the important means to facilitate low carbon transformation. During the 11th Five-Year Plan Period, domestic low carbon technology featured fast development and high energy efficiency. Despite the achievements, limited market penetrations, lack of core technologies and insufficient innovation have hampered the utilization of low carbon technologies. The extent that technology innovation helps reduce GHG emissions is determined by innovation capacity, cost of new technologies and popularization of technologies.

(5) Energy structure adjustment

In recent years, the Chinese government has been actively optimizing the energy structure, vigorously developing renewable energy and supported the exploitation and utilization of renewable energy including biomass energy, solar power, geothermal energy, wind power and other renewable energy sources in rural areas, remote regions and regions with favorable conditions. The proportion of high quality clean energy in total energy consumption has been increased accordingly. *China's Policies and Actions for Addressing Climate Change 2010* states that in 2009 China ranked first in the world

in terms of the newly-added installed capacity of wind power, installed hydropower capacity, nuclear power capacity under construction, photovoltaic cell production and the coverage of solar water heating panels.

In spite of the astonishing development, renewable energy still takes up a small proportion of total energy consumption mix in China. According to the *12th Five-Year Plan for Renewable Energy Development*, the total consumption of renewable energy including hydro power, wind power and bio-fuels (calculated as commodity energy) in 2010 was only 255 million tce, representing only 7.9% of the its total primary energy consumption. If methane and solar power, which are not included in the list of commodity energy, are also added, the total consumption of renewable energy is 286 million tce, representing 8.9% of the overall primary energy consumption mix in 2010.

The *12th Five-Year Plan for Renewable Energy Development* sets the overall goal of renewable energy total consumption to reach 478 million tce, representing 9.5% or more of the overall primary energy consumption mix by 2015. Preliminary estimate predicts that the total energy demand will exceed 4 billion tce by 2015, which means the fossil energy will remain overwhelmingly dominant in China's energy consumption structure. The total consumption of fossil fuels is estimated to be over 3.5 billion tce by 2015, and the absolute growth of fossil energy consumption continues to increase.

Not only the proportion of renewable energy in the total energy consumption is small, the development and utilization of renewable energy is also facing challenges. Technical and economic feasibility is the fundamental problem that is still to be solved for the development of renewable energy. Most renewable energy sectors are still in their early stages, and the cost of development and utilization is relatively high. What's more, uneven resource distribution, small market scale and intermittent production make renewable energy less competitive than conventional energy under the existing market conditions. Meanwhile, China has not established its technology innovation system with competitiveness and is lack of development system for core technology

and basic technology research, which is critical for the cutting edge competitiveness of renewable energy industry, is weak. All these bottlenecks have restricted the potential of renewable energy development in China.

3. Actions and Plans on Greenhouse Gas Emissions Control

China has put the goal of controlling GHG emissions by 2020 on top of its agenda for addressing climate change. *The Work Plan for Greenhouse Gas Emissions Control during the 12th Five-Year Plan Period* has made an overall arrangement for work and tasks of GHG emissions control and specified detailed actions and plans. China will comprehensively take various measures such as optimizing the industrial structure and energy structure, conserving energy and improving energy efficiency to meet the target of reducing CO₂ emission intensity and successfully control GHG emissions.

Economic restructuring and industrial structure adjustment

On its path of accelerated industrialization and urbanization, the industrial structure of China features strong secondary industry and weak tertiary industry. Economic restructuring and industrial structure adjustment play an important role in controlling GHG emissions. On the one hand, the Chinese government should advance the development of tertiary industry, encourage the development of newly emerging strategic industries, while on the other hand, it should also pay attention to the adjustment of the secondary industry and promote industrial optimization. During the 11th Five-Year Plan Period, the proportion of tertiary industry has increased from 40.5% in 2005 to 43.2% in 2010. The 11th Five-Year Plan also accelerated the development of high-tech industries such as information and biology that meet the demand of energy conservation. During the 11th Five-Year Plan Period, the output of high-tech industry increased by over 16% on annual average, mounting to 7.5 trillion Yuan in 2010.

During the 12th Five-Year Plan Period, China will adhere to the path of new industrialization, vigorously developing modern industrial system that is structurally

optimized, clean and safe, high value-added and that features advanced technologies and strong ability to create jobs. Efforts will be made in the following aspects: Firstly to optimize and upgrade manufacturing industry; secondly to develop new industries of strategic significance; thirdly to accelerate the development of service industry. China aims to make major progress in economic restructuring and industrial structure optimization and breakthrough in developing new industries of strategic significance by the end of the 12th Five-Year Plan Period. *The Work Plan for Greenhouse Gas Emissions Control during the 12th Five-Year Plan Period* has set goals for added value of service industry and new industries of strategic significance to take up 47% and 8% of the total GDP respectively.

Energy conservation and energy efficiency improvement

By making various efforts including improving laws and regulations, intensifying accountability, phasing out backward capacity, carrying out key projects, promoting technology advancement, pushing forward policy incentives, tightening regulation and oversight and conducting nation-wide activities, China has made tremendous progress in energy conservation.

During the 11th Five-Year Plan Period, *Energy Conservation Law of the People's Republic of China* was amended which completed the management and standard system of energy conservation, improved related economic policy, and strengthened legal liabilities. To better review the performance, the central government breaks down the overall objective of reducing energy consumption per unit GDP to targets for local governments and establishes a responsibility system for fulfilling energy-saving targets. According to the *Medium and Long Term Energy Conservation Plan*, the central government formulated and issued *Implementation Opinions for Ten Key Energy Conservation Projects during the 11th Five-Year Plan*. China has taken the shut-down of backward production capacity as an important approach of energy conservation and emission reduction and has stepped up efforts in doing so. During the 11th Five-Year

Plan Period, China phased out small-scale coal-fired power plants of 76.82 million kW, backward iron production capacity of 120 billion tons, steel mills of 72 million tons and cement capacity of 370 million tons. An accumulative total of 630 million tce has been saved, reducing 1.46 billion tons of CO₂ emissions. Besides, China has also made enormous efforts in establishing and improving energy efficiency systems and standards. It has formulated *Interim Regulations on Energy Efficiency Assessment and Auditing with Respect to Fixed-Asset Investment Projects*, issued *Catalogue of the People's Republic of China on the Products to Be Attached with Energy Efficiency Labels*, and compiled energy efficiency benchmark manuals for some energy-consuming sectors.

During the 12th Five-Year Plan Period, China will continue to curb the excessive growth of energy intensive sectors and reasonably control the overall energy consumption. *The Work Plan for Greenhouse Gas Emissions Control during the 12th Five-Year Plan Period* claims that by 2015 energy consumption per unit of GDP will drop by 16% as compared to 2010 level and energy-saving capacity of 300 million tce will be available. To fulfill the target, China must take a variety of measures as follows: to strengthen assessment of accountability and the application of assessment results; to improve laws and regulations to set up strict requirements for energy conservation assessment and review and for energy efficiency standards for buildings; to promote market-based mechanism, strengthen the implementation of energy efficiency labels and energy-saving products certification, establish “top runner” standard and system, strengthen power generation dispatching and demand side management and speed up the implementation of energy management contract; to promote government green procurement, improve the system of compulsory purchasing and preferential purchasing; to enhance basic work and capacity building, accelerate the building of energy-saving standard system and to speed up the formulation (revision) of mandatory national energy efficiency in key sectors.

New and renewable energy development

China has vigorously developed new and renewable energy. The government carried out scientific planning for renewable energy development by formulating *Renewable Energy Law* and issuing *Medium and Long-Term Plan for Renewable Energy Development*, the *11th Five-Year Plan for Renewable Energy Development* and the *12th Five-Year Plan for Renewable Energy Development* and released a series of preferential tax policies to boost the development of renewable energy.

During the 11th Five-Year Plan Period, China has seen significant growth of the scale of development and utilization of the various renewable resources. By 2010, the annual utilization of renewable energy totaled 300 million tce (including non-commodity renewable energy like methane and solar power); installed capacity of hydro power continued to top the world at 217 million kW; the accumulative installed capacity of wind power stood at 40 million kW, ranking second in the world; solar Building Block production reached 10 GW, accounting for 45% of the world's total; installed capacity of biomass registered at around 5.5 million kW. *Medium and Long-Term Plan for Nuclear Power Development (2006~2020)* issued by the State Council has declared the overall objective and technology roadmap for nuclear power sector. By 2010, the installed capacity of nuclear power reached 10.82 GW, and additionally 34 units have been approved to build, of which 28 units were under construction. China tops the world in terms of the scale of nuclear facilities under construction, accounting for 40% of the world's total.

During the 12th Five-Year Plan Period, China will further develop green and low carbon energy, advance the development of new energy industries and optimize energy mix. Measures will be taken in the following aspects: firstly to develop hydro power on the premise that ecological protection and settlement are taken good care of; secondly to fasten the construction of grid connection facilities and effectively develop wind power; thirdly to develop new energy including solar power, biomass energy, geothermal energy and tidal wave; fourthly to develop nuclear power in a safe manner; fifthly to develop new energy industries, and especially focus on the development of new

generation of nuclear power, solar-thermal systems and photovoltaic systems, wind power technical equipment, smart grid, biomass energy, as well as plug-in hybrid electric vehicle, pure electric vehicle and fuel cell electric vehicle.

Greenhouse gas emissions control in industrial processes and agricultural production

Since the 11th Five-Year, production of cement and iron and steel has been under control by phasing out backward capacity. GHG emissions during industrial production processes have been properly contained by adopting a number of technologies such as replacing limestone with acetylene sludge in producing clinker, improving production process by adding mixed materials like blast furnace slag and coal ash, recycling waste resources like steel scrap, using secondary and tertiary treatment method to treat discharge of nitrous oxide during production process of nitric acid, using catalytic decomposition and thermal oxidation decomposition to treat discharge of nitrous oxide during production process of adipic acid and using thermal oxidation to capture and eliminate HFC23. In agricultural activities, China has strengthened formulation and implementation of related policy and regulations, adopted a serious technology measures conducive for mitigating GHG emission and pushed ahead with a scientific, scalable and integrated pattern of animal husbandry instead of free-range farming.

During the 12th Five-Year Plan Period, China will speed up R&D and application of GHG emissions control technologies and effectively control GHG emissions in industrial production processes and agricultural activities in the following aspects. Firstly to strictly control exports of the resource products of high energy consumption and high pollution, strictly control the overall expansion of sectors with excessive capacity like metallurgy and building materials, promote pilot programs of clean production and circular economy in key agricultural and industrial sectors, and control waste production and emissions from source and process. Secondly to accelerate the transformation of agricultural development, advance the strategic adjustment of

agricultural structure, optimize the layout of agricultural sector, accelerate the development of facility agriculture, improve the overall level of animal husbandry, enhance the development of modern agricultural demonstration zone, speed up breeding innovation and application of agricultural species and strengthen integrated innovation and utilization of highly-effective cultivation.

4. Carbon Market Experience

At present China participates in carbon market in mainly two ways: First is to participate in international carbon market through Clean Development Mechanism (CDM) projects cooperation; second is for companies to participate in voluntary emissions trading. For environmental protection and public welfare, companies purchase emission reductions credits voluntarily to offset their emissions from production and business activities. Besides, China has launched pilot programs of emissions trading and explored the building of a domestic emissions trading market.

Clean Development Mechanism

As a developing country, China has taken an active part in the flexible mechanisms—Clean Development Mechanism (CDM) all the time. Since 2005, China has developed a large number of CDM projects, and has made remarkable achievements. China tops the world in both terms of registered projects number and estimated average annual reductions. By November 30 2012, the Chinese government has approved 4,778 CDM projects, 2,708 of which have been successfully registered after CDM Executive Board's approval, 52.1% of the world's total. The estimated average annual reductions of Chinese projects are close to 460 million tons of CO₂ equivalent, 65% of the world's total reduction of registered projects. Of the registered projects, 1,007 have been issued with an overall issuance volume of 660 million tons of CO₂ equivalent, 60% of the world's total. In the process of participating in the international carbon market, China has accumulated rich experiences to promote the establishment of national emissions trading scheme, mainly in the following several

aspects.

Firstly, the regulation system has been built. As the participant of CDM, China has its own designated national authority (DNA) - National Development and Reform Commission (NDRC), which is responsible for the management and standardization of the CDM projects development in China. In order to standardize CDM projects development, NDRC has formulated and issued *Measures for the Operation and Management of Clean Development Mechanism Projects* and has drawn experiences from project implementation and improved relevant management. The regulation system will conduct the establishment and standardized operation of national emissions trading scheme.

Secondly, more in-depth and comprehensive understanding of climate change and carbon market has been established through the nationwide CDM capacity building and participation in the CDM projects. People in different regions or sectors have knowledge of carbon market, which creates a favorable environment for the establishment and development of future national carbon market in China.

Thirdly, the relevant market participants have been cultivated during developing CDM projects, including project owners, consultants, third-party certification organization, and financial institutes and so on. These participants have gained more experience in the different part of carbon market, which could directly service the national emissions trading scheme.

What's more, in terms of technical standards development, progress had achieved in developing CDM methodologies such as "New grid connected fossil fuel fired power plants using a less GHG intensive technology"(ACM0013), "Utilization of the cryogenic energy from the LNG" (AM0088), "Methane recovery in agricultural activities at household/small farm"(AMS-III.R), "Introduction of LNG buses to existing and new bus routes"(AMS-III.AY) and "New natural gas based cogeneration plant" (AM0107). The capacity building will help to formulate national standard

system.

Last but not least, various aspects of capacity facilitating the development of the carbon market have been enhanced, including the international carbon trade, carbon asset management, etc. The enhancement of these capacities provides extensive talent reserve for the development of nation carbon market.

Voluntary emission reduction transactions

Since 2008 when Beijing, Shanghai and Tianjin have set up emissions trading exchanges in succession, the voluntary emissions trading market has made its debut and technical standard as well as financial channels have been put in place step by step. 2009 saw the issuance of “panda standard”—a voluntary carbon standard. On June 13th, 2012, the NDRC released the *Interim Regulation for the Trading of China’s Voluntary GHG Emission Reduction* (the Interim Regulation). It will establish and implement a national-level framework of voluntary carbon market trading, including trading process framework, regulation framework and technology supporting system, in a maneuver to standardize voluntary emission reductions of GHG trading, make sure the openness, fairness and transparency of voluntary emission reduction transactions and improve enterprises’ incentives to participate in addressing climate change. On October 9th 2012, the NDRC released the *Guidelines on Validation and Certification of Voluntary Greenhouse Gas Emission Reduction Projects*, which specifies and clarifies the requirements for validation and certification entities, and provides technical specifications for these entities.

Emissions trading pilot program

To implement the target of “gradually establish emissions trading market” raised in the 12th Five-Year Year Plan, the General Office of National Development and Reform Commission issued *The Notice on Carrying Out the Work of Carbon Emissions Trading Pilot Program* in November 2011, approving seven provinces and cities including Beijing, Tianjin, Shanghai, Chongqing, Shenzhen, Hubei Province and Guangdong

Province to carry out pilot program of emissions trading. By learning experiences from foreign countries with emissions trading schemes and in light of the regional and national experiences in project-based emission reduction, the seven provinces and cities are actively formulating pilot plans for emissions trading scheme. Major components of pilot plans may include cap setting and emission allocation mechanism, monitoring, reporting and verification system, registry, trading rules and offset mechanism, etc. Currently the designing of pilot programs in seven regions and cities is being carried out in an orderly manner. The intensive preparatory work for the launching of pilot ETS in 7 regions was mainly taken in 2012, and progress has been made in various regions.

On March 28th, 2012, Beijing convened the kick-off meeting of emissions trading pilot program, making itself the first municipality among the seven pilot provinces and municipalities that has announced the official launching. Beijing also founded Expert Commission for Addressing Climate Change, formed three associations namely Beijing Enterprise Association of Emissions Trading, Association of Consulting Companies and Verifiers and Association of Green Financial Institutes. At the same time, the electronic platform for emissions trading was also officially launched.

On July 3rd, 2012, the Shanghai Municipal government issued the *Notice on Carrying out the Work of Carbon Emissions Trading Pilot Program by Shanghai Municipal People's Government* (the Notice). The Notice stated missions of formulating a regulatory framework for pilot emissions trading for Shanghai and identifying list of participating companies, and made it clear that by 2012 the preliminary preparations and supporting systems shall be accomplished and pilot trading shall be officially kicked off from 2013 to 2015. As the officially-recognized framework of emissions trading, the Notice has stressed on Shanghai's philosophy of integrating companies into pilot scope. It is reported that the regulation for pilot emissions trading for Shanghai will be released in the end of 2012 and emissions trading will start in 2013.

On September 11th, 2012, Guangdong convened the kick-off meeting of emissions trading pilot program, issued the *Implementation Scheme of Guangdong Carbon Emissions Trading Pilot Program*, which clarifies the guiding ideology, objectives, overall arrangements, main tasks and supporting measures of Guangdong Carbon Emissions Trading Pilot Program.

Generally speaking, the preparatory work of each pilot scheme has entered a stage of specifying implementation plan details and building infrastructure. It is anticipated that the 7 regions would finish all the preparatory work and launch pilot ETS programs into full operation 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.

The pilot program across China serves as basic foundation for a national-level and unified emissions trading market. Experiences learned from pilot programs will also be valuable to building a national-level and unified emissions trading market.

Besides, as early as in 1980's and 1990's, in order to reduce SO₂ emissions, China released a set of policy regulations. But administration control of environment pollution was inefficient; the only economic approach—pollution charges were limited because the charges were too low. Under such circumstances, a market approach “SO₂ emissions control and emissions trading was introduced and pilot program of atmospheric pollutant emission allowances system was carried out in 16 major cities, together with pilot program of emissions trading in 6 major cities. Accordingly, management institutes and systems, technology systems and operation mechanism were built up for SO₂ emissions control and allowances system. The pilot programs of SO₂ emissions have accumulated precious experiences worth sharing for emissions trading program in terms of policy formulation, mechanism establishment and capacity building.

Building Block 2: Coverage Identification

1. Background and Necessity

Identifying the sector coverage is the priority for establishing emissions trading system. It means the extent to which the emissions trading scheme will be implemented. There are two dimensions shall be defined, one is from geographical concept; the other refers to covered sectors.

The current objective for the government is to carry out the carbon emissions trading scheme pilot program from 2013 to 2015 and seek to set up a unified emissions trading market during the 13th Five-Year Plan Period. The ultimate objective of this project is to draw up a plan for implementing nation-wide emissions trading scheme, which is to say, the scope coverage is the whole country. The key point for this Building Block is to solve the issues concerning sector inclusion.

In order to identify the industrial scope of emissions trading scheme, it is necessary to comprehend basic information concerning the current emission status and tendency, also consider the potential influence of emissions trading scheme on the development policy and space of various sectors.

In theory, main GHG emitting sectors should be included in the scope of emissions trading scheme as many and wide as possible for more efficiently utilizing more opportunities of low-cost emission reductions and fully decreasing greenhouse gas emissions, however, it may cause more difficult and less operable in term of MRV and administration. Thus in order to determine which sector will be included into ETS, it is necessary to study the capability of MRV of each sector. Meanwhile, the cost-effectiveness has a significant influence to sector coverage. For a specific sector, whether the measure of ETS is more economically efficient than other emission

reduction options, such as standard setting, direct regulation, changes in taxes/subsidies, is a key criteria when considering the sector coverage. In addition, it should be noticed that the sector scope must be prudently identified in order to avoid the situation where the market might be monopolized by limited number of participants. To sum up, determine the sector coverage shall be based on the adequate and rigorous study.

In light of the coverage, main emissions trading schemes overseas vary significantly. Currently, except the Regional Greenhouse Gas initiative (RGGI) which only covers power sector, other ETSs all cover several sectors with distinguishing priority. For instance, construction sector constitutes the main trade entity of Japan's emissions trading scheme, while the industrial sector as the largest emitter of greenhouse gas and consumer of energy has been generally included into the scope of emissions trading scheme, such as EU Emissions Trading Scheme (EU ETS), Western Climate Initiative (WCI) and Carbon Pricing Mechanism (CPM). Take the EU ETS as an example, the sectors covered in phase 1 consist of energy, iron and steel, cement, glass, ceramics and paper making, of which the power consumption capacity is higher than 25MW; sectors covered in phase 2 were expand to aviation, petrochemical, aluminum production. The international experiences with coverage are useful references for China's consideration. Current in China, the secondary industry pillared by industrial sector is the driving force of the country's economic development, and its energy consumption continues to go up. According to the data issued by the NBS, energy consumed by industrial sector in 2000 was 900 million tce, accounting for 68.8% of total current year consumption, in 2009, energy consumption of industrial sector reached 2.19 billion tce, accounting for 71.5% of total current year consumption. Obviously, the energy consumption of industrial sector grows steadily no matter in absolute value or in its percentage in total energy consumption as shown in Figure 2. The industrial sector is hence very influential in CO₂ emission volume in China.

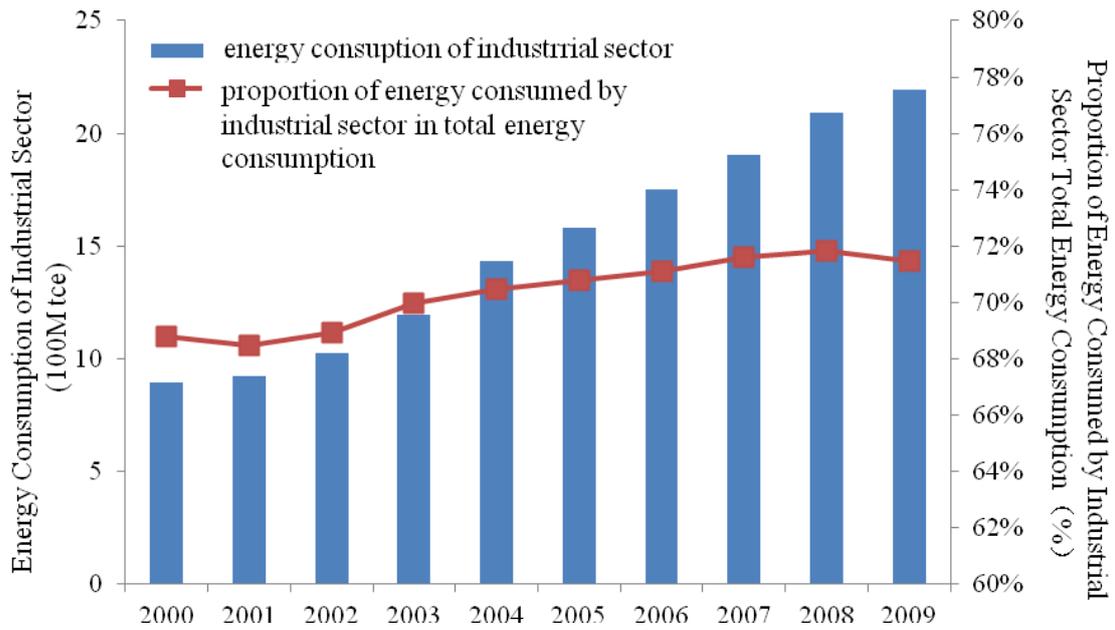


Figure 2 Proportions and Actual Amount of Energy Consumption by Industrial Sectors

The energy consumed by the rest of sectors except industrial sector is shown in Figure 3. Pursuant to the data issued by the NBS, other large emitters include: household energy consumption accounts for over 10% of total consumption; consumption of transportation, post and warehousing maintained at the level of 8%; and consumption of whole sale, retail, accommodation and catering slightly over 2%. Along with acceleration of urbanization and development of the tertiary industry, energy consumption and corresponding proportion of above mentioned sector will raise up. So in the near future, energy consumption of non-industrial sectors will lead to further increase of GHG emission in China.

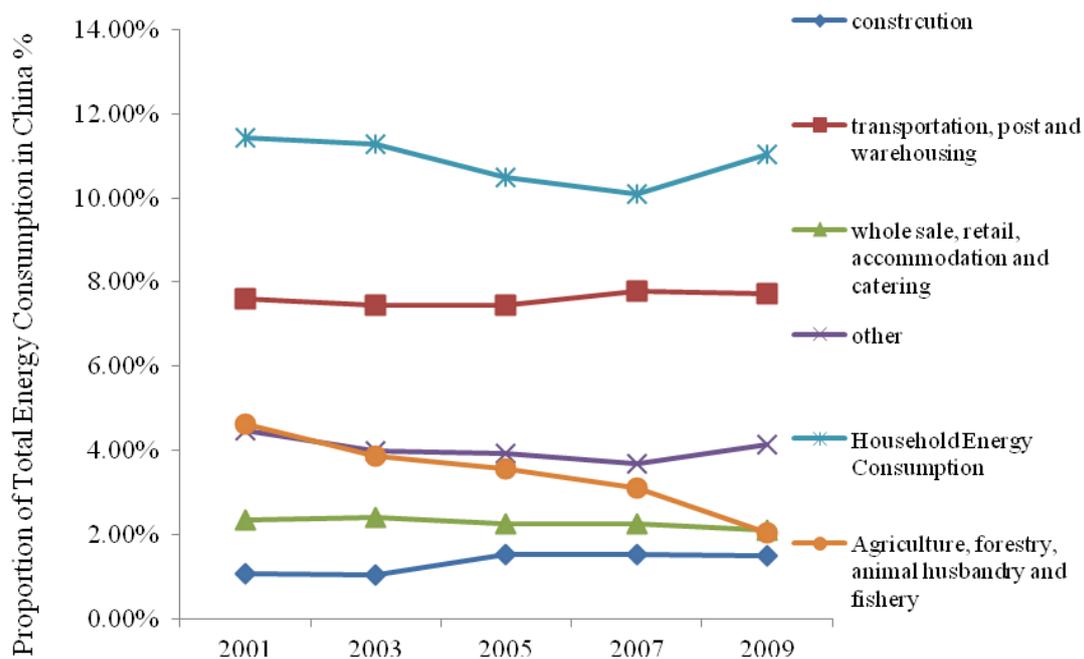


Figure 3 Proportion of Non-industrial Sector Energy Consumption accounted for China's Total Primary Energy Consumption

In summary, CO₂ emissions due to huge volume of energy consumption of industrial sector constitute the major part of total emissions. In addition, CO₂ emissions of non-industrial sectors will go up along with continuously social and economic development in China.

According to the data issued by the NBS in 2009, among the industrial sector, the sectors whose total energy consumption is over 100 million tce are shown in Tab.1. Among these sectors, proportion of energy consumption for each sector in total industrial energy consumption is shown as follows: consumption of ferrous metal smelting and processing sector accounts for 26%; chemical materials and chemical products manufacturing 13%; non-metallic mineral products manufacturing 12%; production of electricity and heat 9%; petroleum processing, coking and nuclear fuel processing 7%; non-ferrous metal smelting and processing 5%; and coal mining and dressing 5%. It should be emphasized that according to statistics of NBS, the data of total energy consumption of electricity and heat production is based on the final energy

consumption of consumer side and is the only available authoritative data. For the purpose of comprehensively understanding the influence of electricity and heat production refer to and CO₂ emission. The IEA's data could be used as a reference that CO₂ emissions due to electricity and heat production sector account for 48.2% in China¹.

Tab1 Major Energy-consumed Sectors and Corresponding Energy Consumption Volume in China's Industrial Sector

Sectors	Energy Consumed (10,000 tce)	Proportion of Energy Consumed in Total Consumption of Industrial Segment
Coal mining and dressing	10207	5%
Petroleum processing, coking and nuclear fuel processing	15328	7%
Chemical materials and chemical products manufacturing	28946	13%
Non-metallic mineral products manufacturing	26882	12%
Ferrous metal smelting and processing	56404	26%

¹ IEA report: *Emissions from Fuel Combustion*

Non-ferrous metal smelting and processing	11401	5%
Production and supply of electricity and heat	19575	9%
Other industrial sectors	50453	23%

These sectors are the largest emitters, major source of greenhouse gas emission and key fields to be monitored in China. However, such kind of sectors classification is too general to practical application. The identified emissions trading scheme industrial scope should be applicable. So in practice, it is necessary to know the emission level of more specific sectors. Take chemical sector as an example. The industrial scope of EU ETS is identified at sub-sector level. For instance, EU ETS covers production of nitric acid, adipic acid, glyoxal, glyoxylate and synthetic ammonia. Similarly, take chemical materials and chemical products manufacturing in China as the example, its energy consumption accounts for 9% of total energy consumption in China and 13% of total energy consumption of industrial sector, this sector can be divided into dozens of sub-sectors including basic chemical material manufacturing, inorganic acid production, sodium hydroxide production, calcined soda production and nitrogenous fertilizer production etc. To get the detail emission information about these sub-sectors has great necessity, and what shall be studied include emission of each segment of the whole sector chain, the emission coverage of the upstream and downstream of the sector chain, also, the coverage designing shall be given an overall consideration and research in order to avoid the double counting of the emissions in a certain sector. Only on the basis of these studies, the scope and coverage would be determined realistically.

Research in industrial scope should not only consider the current status, but also take into consideration the tendency of emission variation of sectors in the future. In the past 20 years, China's economy developed very rapidly. According to the data of total

energy consumption over the years issued by the NBS and total CO₂ emission of fossil energy consumed in China over the years (Figure 5) issued by IEA, energy consumption and CO₂ emission maintains a similar growth trend. Since 2000, energy consumption growth has accelerated which leads to acceleration of CO₂ emission growth.

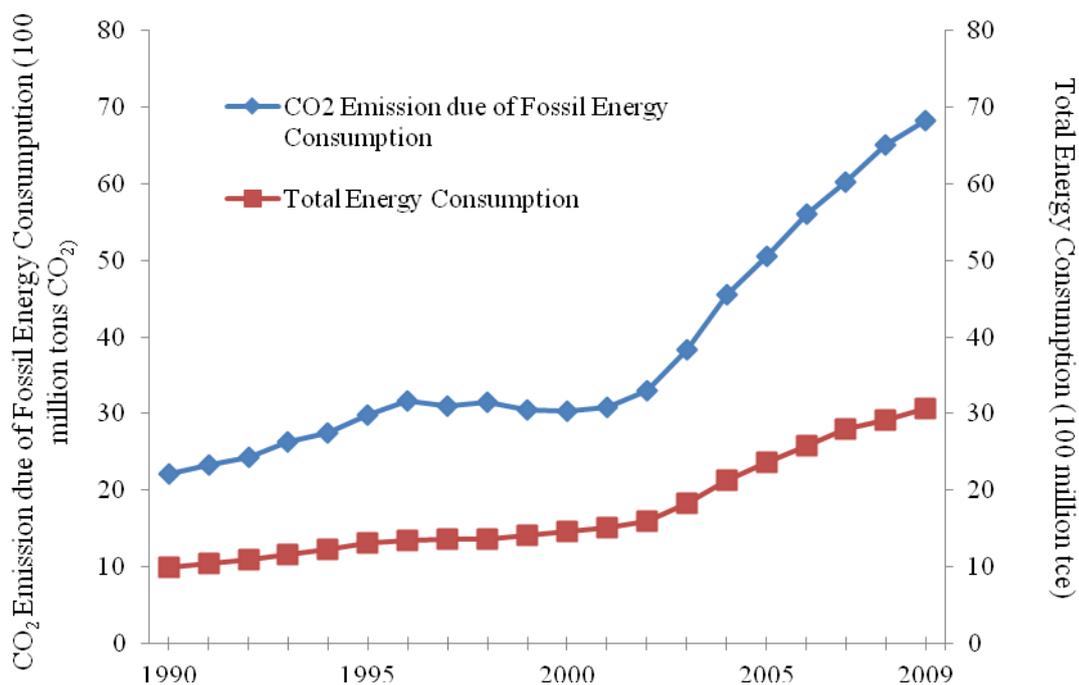


Figure 5. Growth Trend of Total Primary Energy Consumption and CO₂ Emissions of China

Data source: the data of total energy consumption over the years is from the *Statistical Yearbook* published by the NBS; total CO₂ emission over the years is from a research report of IEA named *CO₂ Emissions from Fuel Combustion*.

In the long run, China's economy will keep growing, so will the demand for energy. In the stage of urbanization and industrialization, increasing demand for energy and rigid demand for energy are two distinct features in China. Sectors with high growth rate of emission should be the key considerations since they constitute the major emission sources and are sectors with the biggest emission reduction potentials at the same time.

The foundation of identifying industrial scope is to figure out the current status of greenhouse gas emission sectors and reasonably predict the trend of emission.

The covered sectors should reach certain emissions volume and have significant potentials for emission reductions; otherwise, it is hard to achieve the objective to cut emissions of greenhouse gases through market mechanism. According to the Second National Assessment Report on Climate Change, energy efficiency in China still lags behind compared to the developed countries. Energy consumption per Unit of GDP of steel, cement, synthetic ammonia, oil refinery, ethylene and other major products in China is 21% higher than the world advanced level. Therefore, the potentials of reducing greenhouse gas emissions by improving energy efficiency do exist. Take the steel sector as an example. Estimated steel emission intensity will decrease from 1.8 tons CO₂/ton steel in 2007 to 1.5 tons CO₂/ton steel in 2020 and 1.3 tons CO₂/ton steel in 2030. As being pointed out in the Second National Assessment Report of Climate Change, the industrial sector is the priority and key area of energy conservation and emission reduction. But future research is needed to further understand the relations between technology and reduction potentials, moreover, the relations between economy and reduction potentials.

Introducing the emissions trading scheme is not only for reducing greenhouse gas emissions, but also for stimulating the transfer to low-carbon and green development. Two factors, namely economic development and greenhouse gas emissions control, need to be considered while identifying covered sectors. Because different sectors have great disparity in managing system and marketization level, it is necessary to fully discover the economic influence of emissions trading scheme on different sectors. Only in case the cost of emissions trading should be lower than the return, relevant sectors would have the motivation to participate. For those sectors whose competitiveness are highly affected by carbon price, its cost and competitiveness will be given a great attention, and these factors should also be considered while identifying covered sectors or should be addressed through design features of the ETS. Moreover, other factors to

be considered include the managing system of relevant sectors, foundation and feasibility of greenhouse gas emission reporting and monitoring as well as the difficulties and obstacles of surveillance. Last but not least, the design of coverage will have strong interactions with other energy and climate change policies. The identification and specification of the foreseeable structure of the policy mix such as energy efficiency, renewable energies, others low-carbon sources for the different sectors should be reviewed as a reference document for the subsequent analysis.

At present, the preparation for the emissions trading scheme pilot program has been in the middle and later stages and will be initiated in 2013. These provinces and municipalities in the pilot program identify different high energy consumption and high emission sectors based on their economic status, energy structure, industrial emission reduction potentials and industrial management system etc. Their experience in identifying covered industrial is worth considering and learning. It will be an important basis for identifying covered sectors of a unified emissions trading scheme national-wide.

2. Objective(s)

Formulate China Emissions Trading Scheme Sector Inclusion Criteria and the Implementation Plan. These deliverables are based on study summarizing the experience of identifying sectors coverage at both domestic and abroad, as well as China's actual conditions, such as development progress, emission status, emission tendency, emission reduction potentials and availability and reliability of data etc.

3. Deliverable(s)

- (1) Research Report on Sector Inclusion of Emissions Trading Scheme;
- (2) Sector Inclusion Criteria and Plan of China's National Emissions Trading Scheme (proposed draft).

4. Research Methodology and Activities

4.1 Research Methodology

Investigate and summarize the practical experience of the domestic pilot program and overseas as well as the considering factors for identifying industrial scope for emissions trading scheme. Stipulate the guidance of criteria on industrial scope of a unified national emissions trading scheme.

Through the method of documentation overview, on-site inspection, experts interview and discussion meeting, an in-depth research will be made on major emission sectors such as power, heat, steel, cement, chemicals, petroleum and petrochemical, lime, ceramics, glass, pulp and paper making, non-ferrous metal, aviation and public construction, etc., studying their development, emission status and tendency, emission reduction potentials and cost-effectiveness, availability and reliability of data etc. Analyze industrial managing system, interaction between current emission reduction policy/system and market mechanism; and figure out pros and cons. Based on research results and above mentioned guidance on criteria, propose a recommendation report on sector inclusion of China emissions trading scheme.

4.2 Activities

(1) Study and summarize the main conditions and related considering factors of sector inclusion of emissions trading scheme.

a. Study the thoughts, foundations, plan, practice and experience of sector inclusion adopted by areas in the pilot program of domestic;

b. Study the thoughts, foundations, plan, practice and experience of sector inclusion of emissions trading scheme overseas;

c. Hold symposiums to discuss and analyze the main conditions and related considering factors for identifying industrial coverage of emissions trading scheme.

(2) Determine the Sector Inclusion Criteria of China Emissions Trading Scheme

- a. Based on actual results of the research, preliminary put forward sector inclusion criteria of China Emissions Trading Scheme;
- b. Hold symposiums, invite government and industrial experts, related enterprises to get involve in discussion, listen to their opinion and complete sector inclusion criteria of China Emissions Trading Scheme (proposed draft).

(3) Complete the sector inclusion plan for China Emissions Trading Scheme (proposed draft)

- a. Analyze major emitting sectors in terms of their development, emission status and tendency, emission reduction potentials and cost, availability and reliability of data etc., and preliminarily confirm the sector inclusion plan for China emissions trading scheme;
- b. Hold symposiums, invite government and industrial experts, related enterprises to get involve in discussion, listen to their opinion and complete sector inclusion plan for China emissions trading scheme (proposed draft).

5. TOR

Objective(s) and Rationale

Objective	Rationale
Study and summarize the experience of identifying covered sectors scope at both domestic and abroad; formulate Sector inclusion Criteria and Plan of China Emissions Trading Scheme based on China’s actual conditions like development progress, emission status, emission tendency, emission reduction potentials and availability and reliability of data etc.	See the main text

Deliverable(s)

Deliverable(s)	Description	Party Responsible for Ensuring Action
(1) Research Report on Sector inclusion of Emissions Trading Scheme; (2) Sector inclusion Criteria and Plan of China's National Emissions Trading Scheme (proposed draft).	See the main text	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
Research Report on Sector inclusion of Emissions Trading Scheme	360	1 year
Sector inclusion Criteria and Plan of China's National Emissions Trading Scheme (proposed draft).	360	1 years

Budget

Activity	(in US\$) Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total

<p>(1) Study and summarize the main conditions and related considering factors of sector inclusion of emission trading scheme.</p> <p>a. Study the thoughts, foundations, plan, practice and experience of sector inclusion of emission trading scheme overseas;</p> <p>b. Study the thoughts, foundations, plan, practice and experience of sector inclusion adopted by areas in the pilot program of domestic Emissions Trading Scheme;</p> <p>c. Hold symposiums to discuss and analyze the main conditions and related considering factors for identifying industrial scope of emission trading scheme.</p>					
<p>(2) Determine the Sector inclusion criteria of China Emissions Trading Scheme</p> <p>a. Based on actual results of the research, preliminary put forward sector inclusion criteria of China emission trading scheme;</p> <p>b. Hold symposiums, invite government and industrial experts, related enterprises to get involve in discussion, listen to their opinion and complete Sector Inclusion Criteria of China Emissions Trading Scheme (proposed draft).</p>					
<p>(3) Complete the Sector inclusion Plan for China Emissions Trading Scheme (proposed draft)</p> <p>a. Research and analyze major emitting sectors in terms of their development, emission status and tendency, emission reduction potentials and cost, availability and reliability of data etc. and preliminarily confirm the Sector Inclusion Plan for China Emissions Trading Scheme;</p> <p>b. Hold symposiums, invite government and</p>					

industrial experts, related enterprises to get involve in discussion, listen to their opinion and complete the Sector inclusion Plan for China Emissions Trading Scheme (proposed draft).					
TOTAL BUDGET	300,000				300,000

Sources of Funding	(USD) Total (USD)
National Government	Not counted here. Please refer to the Building Block 8 Total budget for further information.
PMR	\$300,000
Other (if applicable)	\$0
Grand Total	\$300,000

Building Block 3: Main Technical and Institutional Elements

To establish and operate a country-wide ETS requires necessary infrastructure and capacity, including a mature statistic base, an effective management system and established legal framework and policies. This Building Block develops a thorough working plan to evaluate the main technical and institutional elements required for a domestic emissions trading market. The progress, achievement and deficiencies done by the central government, the ETS pilot areas and other pilot provinces and municipalities on low-carbon programs is studied. The basis and deficiencies of ETS is identified. Execution of the plan proposed in this research project will contribute to building necessary infrastructure and capacity for the ETS in China.

1. Data

1.1 Background and Necessity

When designing the ETS, either to set its coverage and scope, caps or allowance allocations, it is essential to collect data of different types and different levels. In the provincial and national level, the data of total emissions and economic development (e.g. GDP) is required. And in the sector level, it is necessary to attain data of the production capability, GHG emissions, reduction potentials and reduction costs of the emission-intensive sectors. Furthermore the distribution of the above factors of the companies and installations in the sector is also needed. For example, the data required for the power sector may include the number of power plants, the distribution of the installation capacity, GHG emissions, reduction potentials, and reduction costs.

However, some of the data cannot be obtained directly. Therefore calculation methods or forecast models based on the basic data should be utilized to attain such data indirectly. For an instance, emissions data can be calculated with activity data and

emission factors. Activity data might contain data of energy activities and outputs, etc. Still emission reduction potentials and reduction costs can be obtained by calculating the data of technologies, economic activities and the calculated emissions.

To sum up, in order for setting up a country-wide ETS, it is necessary to collect the multi-level basic data of energy activities, outputs, technologies and economic activities. Additionally respective emission factors for different types are also required. Calculation methods and forecast models are addressed in other research projects. In this project the main focus is on basic statistics.

1.2 Objective

The purpose of this research project is to identify data demands in building the China ETS, and analyze the gaps between relevant available statistical data and demanded data. Based on the results, a proposal on statistics for the China ETS will be presented. According to the proposal, statistics of relevant basic data will be performed. This component will also provide methods of building statistics system for the China ETS.

1.3 Deliverables

- (1) An analysis report on the multi-level data demands of the China ETS;
 - a. Summarize the data demands of ETS in multiple countries;
 - b. Summarize the demands of ETS pilots in China;
 - c. Propose the data demands for the China ETS;
 - d. Identify the supports available from current data statistics system, and find the gaps between available data and demanded data; and
 - e. Work out a feasible proposal on basic data statistics.
- (2) Established multi-level statistics results for the China ETS; and
- (3) Proposed methods of establishing statistics system for the China ETS.

1.4 Research Methodology and Activities

1.4.1 Methodology

(1) Literature review of the multi-level data demands in the ETSs of EU, Austria, New Zealand, Korea, and California.

(2) Combining the field research and expert interviews to learn the multi-level data demands of EU ETS and the statistics system at the national, provincial and sector levels in China.

(3) Based on the requirements in the proposal on statistics for the China ETS, organize the institutions and staffs to conduct statistics at the company level and from the statistics frame to support the compiling of an execution plan for the China ETS.

1.4.2 Research activities

(1) Study the data demands in the ETSs of EU, Australia, and California, and their experiences in filling the gaps between existing data and demanded data, including:

a. Data demands pre-establishment, in particular, the data contents, costs and statistical methods;

b. Requirements for companies' emissions reporting in EU, Australia and US, and their data demands at company level; and

c. Their experiences in fixing data incompleteness.

(2) Study the data demands of the ETS pilots in China, challenges encountered and their solutions, including:

a. Data demand in the 7 pilot provinces and municipalities when establishing the ETS; and

b. Challenges in statistics and their solutions.

(3) Study the status of statistics at the national, provincial and sector levels, through literature review, expert consultations and seminars. The NBS and industry associations will be the major research objects.

a. Research into data collection in compiling greenhouse gas inventory at the national and provincial levels, host seminars to review and clarify the difficulties and focal points in data collection;

b. Research into the existing data at the national, provincial and sector levels at the NBS;

c. Research into the existing data at the sector level at relevant industry associations; and

d. Summarize differences between the NBS data and data from associations.

(4) Summarize and analyze the data demands of the China ETS. Analyze the current status and gaps and deliver a feasible proposal on statistics.

a. Discuss with the research fellows on other sub-research projects. Present an introduction of the current statistics system in China and obtain knowledge of the data demands in those research projects;

b. Identify basic data demands in building the China ETS;

c. Compare data demands with existing statistics systems and find the gaps between data demanded and data available. Deliver a statistics proposal applicable to China according to the results of the comparison; and

d. Compile an analysis report on the multi-level data demands for the China ETS.

(5) Based on the proposal above, organize the institutions and staffs to collect data of different level and form the results.

a. Establish unified data collecting target, approach and standard, and develop standardized data collection forms;

b. Establish a statistic platform combining data collection, transfer, processing, storage and utilization; and

c. Complete the statistics required for building the China ETS.

(6) Establish the methods of building a multi-level statistics system for the China ETS based on the applications.

a. Organize seminars to exchange views on data application. Explore the methods of building a multi-level statistics system for the China ETS; and

b. Compile a report on the methods of building a multi-level statistics system for the China ETS.

1.5 TOR

Object and Rationale

Objective	Rationale
Identify data demands in building the China ETS, and analyze the gaps between relevant available statistical data and demanded data. Based on the results, a proposal on statistics for the China ETS will be presented. According to the proposal, statistics of relevant basic data will be performed.	See the main text.

Output

Deliverable(s)	Description	Party Responsible for Ensuring Action
(1) An analysis report on the multi-level data demands of the China ETS; a. Summarize the data demands of ETSs' establishment in multiple countries; b. Summarize the demands in ETS pilots in China;	See the main text	National Development and Reform Commission is the leading organization. Other government agencies are the members of the Steering Committee, providing policy guidance and necessary environment for the research institutions.

<p>c. Propose the data demands for the China ETS; d. Identify the supports available from current data statistics system, and find gaps between available data and demanded data; and E. establishes a feasible proposal on basic data statistics. (2) Proposed methods of establishing statistics system for the China ETS.</p>		
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Timeline

Output	Time Required for Completion(days)	Completion Date
An analysis report on the multi-level data demands of the China ETS	180	Half a year
Proposed methods of building data system for China ETS.	360	One year

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year2	Year 3	...	Total
<p>(1) Research into the data demands in the ETSS of EU, Australia, and California, and their experiences in filling the gaps between existing data and demanded data, including :</p> <p>a. Data demands pre-establishment, in particular, the contents of data collection, the costs of data collection and statistical methods of data collection;</p> <p>b. Requirements for reporting emissions by companies in EU, Australia and US, and their data demands at company level; and c. Their experiences in fixing data incompleteness.</p>					
(2) Research into the data					

<p>demands, the challenges encountered and their solutions in the ETS pilots of China, including:</p> <ul style="list-style-type: none"> a. Data demand in the 7 pilot provinces and municipalities when establishing the ETS; and b. Challenges in statistics and their solutions. 					
<p>(3) Study the status of statistics at the national, provincial and sector levels, through literature review, expert consultations and seminars. The NBS and industry associations will be the major research objects.</p> <ul style="list-style-type: none"> a. Research into data collection in compiling greenhouse gas inventory at the national and provincial levels. Host seminars to invite experts' reviews and comments, and clarify the difficulties and focal points in data collection; b. Research into the existing data at the national, provincial and sector levels at the NBS; c. Research into the existing data at the sector level at relevant industry associations; and d. Clarify differences between the NBS data and data from associations. 					
<p>(4) Summarize and analyze the data demands of the China ETS. Analyze the current status and gaps, and present a feasible proposal on statistics.</p> <ul style="list-style-type: none"> a. Discuss with the research fellows on sub-research projects. Present an introduction of the current statistics system in China, and obtain knowledge of the data demands in those research projects; b. Identify basic data demands in building the China ETS; c. Compare data demands with existing statistics systems and identify the gaps between data demanded and data available. Deliver a statistics proposal applicable to China according 					

to the results of the comparison; and d. Compile an analysis report on the multi-level data demands for the China ETS.					
(5) Based on the proposal above, organize the institutions and staffs to collect data of different level and form the results. a. Establish unified data collecting target, approach and standard, and develop standardized data collection forms; b. Establish a statistic platform combining data collection, transfer, processing, storage and utilization; and c. Complete the data statistics required for building the China ETS.					
(6) Establish the methods of building a multi-level statistics system for the China ETS based on the applications. a. Organize seminars to exchange views on data application, and explore the methods of building a multi-level statistics system for the China ETS; and b. Produce a report on the ways of building a multi-level statistics system for the China ETS.					
TOTAL BUDGET	300,000	200,000			500,000

Sources of Funding	Total (USD)
National Government	Not counted here. Please refer to the Building Block 8 Total budget for further information.
PMR	500,000
Other (if applicable)	0
Grand Total	500,000

2. Management System

2.1 Background

China has been building and constantly improving its management system and working mechanism to address climate change. In 2008, the NDRC set up the Department of Climate Change, responsible for addressing climate change issues. Local governments also institute new authorities or enhance the working mechanism to address climate change, and designated leading groups were established in 31 provinces, autonomous regions and municipalities directly under the central government. Some local governments designate this task specifically to the local development and reform commission, which then institute a new Division on Climate Change, or task the current Division on Resources and Environment with responsibilities for climate change, or integrate it with Division on Climate Change.

To set up an emissions trading market is definitely a very massive task, which poses greater challenge to the administrative capacity. An integrated management system is required to ensure smooth operation and effective management of the market. In Australia, for instance, Congress passed the set of laws to definite the responsibilities and distributions between the various departments: the Department of Climate Change and Energy Efficiency develops policies for carbon pricing mechanism; the Treasury evaluates policy impacts; the Clean Energy Regulator executes the policies, and the Australian Securities and Investment Commission regulates the approval and daily trading at the exchanges.

According to *the Opinions of Shanghai Municipal Government on Implementing Emissions Trading Pilot Program*, special Leading Group will be set up to guide and coordinate the pilot program. A deputy mayor with related duties will chair the Leading Group, and other members of group include principals of Shanghai Municipal Development and Reform Commission (Shanghai DRC), Commission of Economy and

Informatization, Commission of Commerce, Finance Bureau, Urban Construction and Communications Commission, State-owned Assets Supervision and Administration Commission, Statistics Bureau, Tourism Administration, Transport and Port Authority, Bureau of Quality and Technical Supervision, Legislative Affairs Office, and Office of Financial Service. The Leading Group's office will be located within Shanghai DRC, to push forward the implementation of the pilot program daily execution of other involved government agencies. The principal of Shanghai DRC will be the Director-General. An Expert Committee on emissions trading will be established. The committee will invite relevant experts with low-carbon and climate change background to provide professional guidance, technical support and policy advices. Shanghai DRC shall coordinate with other authorities to ensure smooth operation of the pilot program based on the division of work. Arrangements and experience of Shanghai and other pilot areas on ETS management system will surely provide important reference for the designing the management system for the nation-wide emissions trading market.

In order to design the management system of the future China carbon market, it is useful to first define the relative functions and duties necessary for the management and regulation of a carbon market. This could be done thorough studying and abstract necessary elements from the management systems of existing foreign carbon markets. The second question goes to the matching of relative functions to corresponding government departments or organizations, being them already existing or newly established. This is to answer, based on an assessment of China's national circumstance related to its administrative and bureaucratic system, whether the current Chinese governmental organizations would suffice to manage a national carbon market or new institutions is needed. And the last question is to answer the relationship between different ministries and agencies, the division of labor and the relationship between central government and local governments in terms of carbon market management.

Judged from the foreign experience and the administrative organization structure of China, the management system for the future emissions trading market should at least

address the following three issues:

First, designate a competent authority to take charge of daily operation and management of the ETS. Basic responsibilities of this authority can be categorized as follows: allocation and auction, MRV, operation and maintenance of the registry, formulating trading rules, regulating trading market, assessing enterprises' compliance, enforce punishments or provide incentives, and evaluating the market, etc. Under the current management system, as the designated authority for carbon market and low-carbon policies, the NDRC is expected to shoulder the management responsibilities. To meet these demands, it is worth exploring the necessity of personnel increments and new management institutions. Additionally, according to their administration scope, the responsibilities of other government agencies shall also be clarified.

Second, establish a coordination mechanism among government agencies to avoid overlap of functions. The establishment and operation of an emissions trading market relates to multiple government agencies. To set the total emission target, for example, may require coordination among authorities for economy, energy, industry and statistics. The treatment and disposal of allowance, as a private property in financial and accounting standards is related to finance and taxation authorities. Trading and regulation of futures, options and other derivatives on allowances are subject to the securities regulators. Therefore, an effective working mechanism must be put in place to enhance coordination and cooperation.

Third, set up an expert committee or other think-tank. In the design, operation and management of the ETS, experts' support is indispensable in tacking with technical issues like setting cap, allowances allocation plans, price policy, balancing mechanism for supply and demand, offsetting methodology and implementing processes. Such think-tank will provide technical support for the decision making.

2.2 Objectives

The research will look into the building and operation of the management system for ETSs, understand the basic elements, structure and functions, and evaluate the practices and lessons learned in the existing ETS pilot programs. Then, it will make policy recommendations for a management system governing China's national emissions trading market which fits for the actual situation in China.

2.3 Deliverables

(1) Report on the management system for ETS, including:

a. Research into the management systems for ETS, including the basic functions and responsibilities of a management system and the corresponding institutional arrangements, division of labor and responsibilities, and coordination among different government agencies; and

b. Research into management systems of China's domestic ETS pilot programs, their definition of functions and responsibilities, institutional arrangements, designation of power and responsibility, and coordination among different government agencies;

(2) Proposal on the Management System of the China national ETS

2.4 Research Methodology and Activities

2.4.1 Methodology

To institute a management system for China emissions trading scheme must build on the practices and experience of established carbon market overseas, and must observe general rules of market management, and consider China's own realities. After a research into the practices both at home and abroad, this project will conduct comparative analysis, and identify the contents and functional position of the management system for emissions trading market. Having had thorough understanding

of the current national system of administrative mechanism, the demands in building a nation-wide ETS and possible challenges, this project will come up with policy recommendations for setting up a management system for China's national emissions trading market.

2.4.2 Activities

(1) Look into the management systems of foreign emissions trading markets

- a. Conduct literature review to get a view of management systems in the ETSs of EU, Australia and California, including their organization structures, responsibilities and coordination among concerned government departments;
- b. Hold experts consultations to further understand the organization structures and related responsibilities in foreign emissions trading markets, especially the coordination among concerned departments, and how the current management system meet the needs, and whether they set a up new institutions to govern the market and why, and the features, pros and cons of the management system;
- c. Organize seminars to invite experts from home and abroad to discuss topics related to management systems of overseas emissions trading markets; and
- d. Produce a research report on the management system of ETS in foreign countries.

(2) Evaluate and summarize experience and lessons on management systems in domestic ETS pilot programs.

- a. Literature review to get a view of management systems in the domestic ETS pilot programs, including their organization structures, responsibilities and coordination among concerned government departments;
- b. Field research combining the expert interview to look into the management systems in the pilot programs, their experience and lessons;
- c. Seminars to invite experts' views on the management systems of domestic pilot

programs, compare with other management systems on the advantages and disadvantages, and draw the lessons and experience; and

d. Produce a research report on management system of the China ETS.

(3) Generalize the fundamental elements in building management system for emissions trading market, and relevant experience and lessons

a. Compare the above-mentioned two activities; summarize the fundamental elements in building management system for emissions trading market. Analyze the similarities and differences between domestic and international management systems, as well as their pros and cons; and

b. Hold seminars to solicit expert comments on result of item *a*.

(4) Make a proposal on the management system for the China ETS

a. Make recommendations on the management system for China's emissions trading market based on the previous activities (1), (2) and (3).

b. Conduct experts seminars of discussions on the recommendations of the current administrative system of domestic emissions trading market management system construction under item (4) *a*, especially discuss their rationality and feasibility; and

c. Produce a report on recommendations for the management system for the China ETS.

2.5 TOR

Objective(s) and Rationale

Objective	Rationale
Look into the building and operation of management systems in overseas ETSs, understand their basic elements, structure and functions and evaluate the practices and lessons learned in these ETSs combined with an evaluation of the domestic ETS pilot programs. Make policy recommendations for a	See the main text

management system governing China's national emissions trading market based on the actual situation in China.	
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Deliverable(s)

Deliverable(s)	Description	Party Responsible for Ensuring Action
<p>(1) Report on the management system for the ETS, including: a. research into overseas management systems for ETSs, their definition of right and responsibility, institutional arrangements, designation of right and responsibility, and coordination among different government agencies; and b. research into management systems for domestic ETS pilot programs, their definition of right and responsibility, institutional arrangements, designation of power and responsibility, and coordination among different government agencies;</p> <p>(2) <i>Proposal on the Management System of the China ETS</i></p>	See the main text	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
Report on the management system for the ETS	360	one year
Proposal on the Management System of the China ETS	360	one year

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total
<p>(1) Look into the management systems of overseas emissions trading market</p> <p>a. conduct literature review to get a view of management systems in the ETSs of EU, Australia and California, including their organization structures, responsibilities and coordination among concerned government departments;</p> <p>b. hold experts consultations to further understand the organization structures and relate responsibilities in overseas emissions trading markets, especially the coordination among concerned departments, and how the current management system meet the needs, and whether they set a up new institutions to govern the market and why, and the features, pros and cons of the management systems;</p> <p>c. organize seminars to invite experts from home and abroad to discuss topics related to management systems of overseas emissions trading markets; and</p> <p>d. Produce a research report on management system of ETS in foreign countries.</p>					
<p>(2) Evaluate and summarize experience and lessons on management systems in domestic ETS pilot programs.</p> <p>a. literature review to get a view of management systems in the domestic ETS pilot programs, including their organization structures, responsibilities and coordination among concerned government departments;</p> <p>b. field research combining the expert interview to look into the management systems in the pilot programs, their experience and lessons;</p>					

<p>c. seminars to invite experts' views on the management systems of domestic pilot programs, compare with other management systems on the advantages and disadvantages, and draw the lessons and experience; and</p> <p>d. Produce a research report on management system of the China ETS.</p>					
<p>(3) Generalize the fundamental elements in building management system for emissions trading market, and relevant experience and lessons</p> <p>a. Compare the above-mentioned two activities; summarize the fundamental elements in building management system for emissions trading market. Analyze the similarities and differences between domestic and international management systems, as well as their pros and cons; and hold seminars to solicit experts' views on the research results of item <i>a</i>.</p>					
<p>(4) Make a proposal on the management system for the China ETS</p> <p>a. make recommendations on the management system for China's emissions trading market based on the previous activities (1), (2) and (3).</p> <p>b. conduct experts seminars of discussions on the recommendations of the current administrative system of domestic emissions trading market management system construction under item (4) <i>a</i>, especially discuss their rationality and feasibility; and</p> <p>c. produce a report on recommendations for the management system of the China ETS.</p>					
<p>TOTAL BUDGET</p>	<p>150,000</p>				<p>150,000</p>

Sources of Funding	Total (USD)
National Government	Not counted here. Please refer to the Building Block 8 Total budget for further information.
PMR	\$150,000
Other (if applicable)	\$0
Grand Total	\$150,000

3. Legal Framework

3.1 Background and Necessity

As the emissions trading market is established on the basis of emissions permits, a favorable legal framework and policy environment provides key safeguards for its establishment and operation. Research into the fundamental legal framework is to define the legal basis for establishing and operating a country-wide emissions trading market. The purpose is to develop a framework with basic rules, so as to provide institutional safeguards for emissions trading, and ensure a fair, open and equitable market.

China has started to develop administrative rules for the ETS pilot programs. These rules will constitute as the “basic law” for those pilot regions. Additionally, technical standards and implementation rules will be formulated to tackle technical issues in the pilot programs. The entire legal framework will thus consist of the above-mentioned administrative rules and other technical standards and implementation rules, where the former serves as the basic and higher-level law, and the latter as the specific and lower-level regulations. The domestic ETS pilot programs are faced with a common challenge, i.e. absence of fundamental laws and regulations. The local legislation is inadequately binding to the incorporating enterprises.

This research will review the legislation practices in overseas ETSs, and analyze the experience and lessons in the domestic ETS pilot programs. It will come up with policy

recommendations for the legal framework of the China ETS in the future.

3.2 Objectives

This research project will analyze the legislative practices in overseas ETSs, and domestic ETS pilot programs, as well as the problems encountered, experience and lessons learned in building the legal framework. The focus is to understand the legal nature of the legislative package creating the ETS, the structure of different laws and regulations, and their relations to the existing legal systems. Based on this, it will make recommendations for the basic legal framework, and produce proposed draft laws for the China ETS.

3.3 Deliverables

- (1) A research report on the basic legal system for the China ETS;
- (2) Administrative Rules for the China ETS (draft proposal).

3.4 Research Methodology and Activities

3.4.1 Methodology

In this project, it will conduct research into the practices in both domestic and international ETSs, evaluate and summarize the experience and lessons learned thereof. Based on the research findings, it will identify the main constitution of their legal frameworks, as well as their pros and cons, and understand the importance of legal framework to ETS, its necessity, basic contents and functions. Through interviews with experts and related authorities, it will deliver policy recommendations for the legal framework of the China ETS, to pave the way for sound and steady operation of the emissions trading market.

3.4.2 Activities

- (1) Research into the legal frameworks in overseas ETSs

- a. Literature review: understand the legal frameworks of ETSs in EU, New Zealand, Australia, South Korea and California , including their legislation systems, contents, and frameworks, functions of the laws and correlations, problems encountered in establishing the framework and experience and lessons learned; and
- b. Conduct seminars: invite expert views and feedbacks on the initial research findings.

(2) Evaluate the legal frameworks in China's ETS pilot programs

- a. Literature review: review the documentation on legal framework establishment in these pilot programs to understand the basics, contents, and frameworks, functions of the laws and correlations;
- b. Field research: visit the competent authorities and experts, monitor and evaluate the obstacles and challenges in building the legal framework for the pilot programs and in operating the ETS, so as to draw some experience and lessons, understand the correlation between the challenges and the legal framework. Under the current administrative system and legal environment, efforts will be made to explore the ways of establishing basic legal framework for a country-wide emissions trading market.
- c. Conduct seminars: invite domestic and foreign experts who joined in the pilot ETSs at home or abroad to give their feedbacks and recommendations for the legal framework of ETS, on the basis of the experience and lessons learned in these pilot programs and the field research findings; and

(3) Deliver a research report on the legal framework for the China ETS

- a. Comparative analysis: based on the above-mentioned two activities, efforts will be made to analyze the experience and lessons in building legal frameworks in international ETSs and domestic pilot ETS, understand the common issues and issues unique to China, and make initial policy recommendations for establishing the legal framework by considering the experience of pilot ETS and China's realities;
- b. Conduct seminars: invite experts' feedbacks and recommendations on the

conclusions of and recommendations for item a; and

c. Deliver a research report on the legal framework for the China ETS.

(4) Produce *Administrative Rules for the China ETS* (proposal) based on the previous activities.

3.5 TOR

Objective(s) and Rationale

Objective	Rationale
This research project will analyze the practices in overseas ETSs, and domestic ETS pilot programs, as well as the problems encountered, experience and lessons learned in building the legal framework. Based on this, it will make recommendations for the basic legal framework and produce proposed laws of the China ETS.	See the main text

Deliverable(s)

Deliverable(s)	Description	Party Responsible for Ensuring Action
A research report on the basic legal system for the China ETS;	See the main text	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.
<i>Administrative Rules for the China ETS</i> (draft proposal).		

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
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A research report on the basic legal system for the China ETS;	720	Two years
<i>Administrative Rules for the China ETS</i> (proposal).	720	Two years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year2	Year3		Total
<p>(1) Research into the legal frameworks in overseas ETSs.</p> <p>a. Literature review: understand the legal frameworks of the ETSs in EU, New Zealand, Australia, South Korea and California , including their legislation systems, contents, and frameworks, functions of the laws and correlations, problems encountered in establishing the framework and experience and lessons learned; and</p> <p>b. Conduct seminars: invite experts' views and feedbacks on the initial research findings.</p>					
<p>(2) Evaluate the legal frameworks in China's ETS pilot programs</p> <p>a. Literature review: review the documentation on legal framework establishment in these pilot programs to understand the basics, contents, frameworks, functions of the laws and correlations;</p> <p>b. Field research: visit the competent authorities and experts, monitor and evaluate the obstacles and challenges in building the legal framework and in operating the ETS, so as to draw some experience and lessons, understand the correlation between these challenges and the legal framework. Under the current administrative system and legal environment, efforts will be made to explore the ways of establishing basic legal framework for a country-wide emissions trading market.</p> <p>c. Conduct seminars: invite experts who joined in the pilot ETSs at home or abroad to give their feedbacks and</p>					

recommendations for the legal framework of the ETS, on the basis of the experience and lessons learned in these pilot programs and the field research findings.					
(3) Deliver a research report on the legal framework for the China ETS a. Comparative analysis: based on the above-mentioned two activities, efforts will be made to analyze the experience and lessons in building legal frameworks in international ETSs and domestic pilot ETS, understand the common issues and issues unique to China, and make initial policy recommendations for establishing the legal framework for the China ETS, by considering the experience of pilot ETS and China's realities; b. Conduct seminars: invite experts' feedbacks and recommendations on the conclusions of and recommendations for item a; and c. Deliver a research report on the legal framework for the China ETS.					
(4) Produce <i>Administrative Rules for the China ETS</i> (draft proposal) based on the previous activities.					
TOTAL BUDGET	100,000	50,000			150,000

Sources of Funding	Total (USD)
National Government	Not counted here. Please refer to the Building Block 8 Total budget for further information.
PMR	\$150,000
Other (if applicable)	\$0
Grand Total	\$150,000

Building Block 4: Components for the Design of China Emissions Trading Scheme (China ETS)

1. Scope

1.1 Background

To establish a nation-wide ETS, it is required to identify its scope, as the scope is the pre-condition to determine a cap on emission and the allowance allocation. Under the ETS scope, there are two aspects: the types of greenhouse gases; and the tier of emissions sources like enterprises/ installations.

Aspect 1): greenhouse gas types. The first commitment period of *Kyoto Protocol* defines six types of greenhouse gases. But considering difficulties in monitoring and measuring greenhouse gases, and the dominant proportion of CO₂ emissions in the total emissions of greenhouse gases, current ETS in the world adopt the practice of considering CO₂ at the initial stage, and covering the other types of greenhouse gases gradually. Take the EU ETS as an example, it covered CO₂ only in its first phase, and covered N₂O into this scheme subsequently. Having reviewed the respective emission ratios of covered entities, the cost-effectiveness and data availability, the existing ETSs usually incorporate the industrial sectors with high emission ratios and determine the scope on a step-by-step basis. To put it simply, these schemes focus on the larger emitters and leave smaller ones untouched in the beginning. For instance, in Phase I of EU ETS, it covered energy sector, oil refineries, iron and steel manufacturers, cement clinkers, glass and ceramics bricks, and paper making industries, and set incorporating thresholds for the enterprises. In the subsequent phases, its coverage extends to aviation sector, production and processing of aluminum, non-ferrous metals and nitric acid.

Aspect 2): tier of enterprises or installations. Based on ETS experiences of developed countries, there are two tiers of objects under the ETS scope, tier of enterprises and tier of installations. Since an enterprise is composed by installations, such two tiers have tight relationship with each other and could be converted to each other. It is advisable to keep consistency with the existing energy statistics and evaluation system. Since China exercises price controls on the electricity and heat providers, the emissions cost might be unable to transfer to the downstream, it is an option to incorporate the indirect emissions from the consumption of electricity and heat into the scheme. But this may lead to the possibility of double counting by covering the emission sources from the producer side and the consumer side simultaneously. Further research is thus required on whether to include those on the consumer side, and if so, how to address the potential challenges. It is also a key issue how to address the enterprises/installations registered with the CDM project.

To sum up, the scope is an important element to establish the emissions trading market. When setting the scope, the following factors have to be considered: the amount of emissions by the covered emission sources, the ratio of the emissions to the total emissions nationwide, reduction potentials, and differences in abatement costs, regulatory cost-effectiveness and data availability. The more sectors and emission sources the scheme covers, the greater are the reduction potentials and differences in abatement costs, and the less reduction costs will need. Yet, it poses bigger regulatory challenges and requires more data. When the covered sectors are identified, efforts have to be made further to determine the types of compliant greenhouse gases by these sectors, emission characteristics, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism.

1.2 Objectives

Analyze the major emission sources and their emission mechanism based on the covered sectors set in Building Block 2, then determine the types of compliant

greenhouse gases in the participating sectors. Set the covered standards for enterprises/installations under the ETS. This section will consider the treatment methods for the covered enterprises/installations to participate in the project-based emission reduction mechanisms.

1.3 Deliverable(s)

- (1) A research report on the scope of ETS (types of greenhouse gases, enterprises/installations);
- (2) Covered Greenhouse Gases under China ETS (proposed draft);
- (3) Incorporating Standards for the Enterprises/Installations under China ETS (proposed draft).

1.4 Research Methodology and Contents

Methodology employed in this section includes literature research, field research, expert consultation, comparative study with both qualitative and quantitative analyses, and cost-effectiveness analysis.

Specific research contents are as follows:

- (1) Use both literature and field research to get a view on the scope of emissions trading schemes (types of greenhouse gases covered, and incorporated enterprises/installations) both at home and abroad;
- (2) Identify the ratio of covered emissions to the total emissions country wide, abatement potentials, differences in abatement costs, regulatory cost-effectiveness and data availability. Conduct comparative study between China's future ETS and other ETSs by adopting both qualitative and quantitative analyses.
- (3) Research into CDM registered projects within the scope of scheme.
- (4) Draft *Covered Greenhouse Gases under China ETS* (proposal) and *Incorporating*

Standards for the Enterprises/Installations under China ETS (proposal).

(5) Invite expert comments on the two proposals, revise and submit the *Covered Greenhouse Gases under China ETS* and *Incorporating Standards for the Enterprises/Installations under China ETS*.

1.5 Research Activities

(1) Research into the scope under major ETSs overseas (types of greenhouse gases, covered enterprises/installations):

a. on EU ETS, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism;

b. on US RGGI, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism;

c. on New Zealand ETS, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism;

d. on Australia ETS, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism;

e. on other ETSs, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism;
and

f. find similarities and differences in the scopes under above mentioned ETSs.

(2) Research into the scope under the pilot ETSs in China:

- a. literature research into the scope of pilot ETS in China, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism;
- b. field research into the CDM registered projects within the scope; and
- c. identification of similarities and differences in the scope of the pilot ETSs.

(3) Deliver *Covered Greenhouse Gases under China ETS* (proposed draft)

- a. identify types of greenhouse gases by the covered sectors, and emission characteristics;
- b. identify the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism;
- c. draft *Covered Greenhouse Gases under China ETS*
- d. organize seminars and consultations, invite comments and suggestions from the competent authorities, enterprises, and other third party institutions and experts; and
- e. revise and submit *Covered Greenhouse Gases under China ETS* after incorporating the feedbacks.

(4) Deliver *Incorporating Standards for the Enterprises/Installations under China ETS* (proposal)

- a. identify the types of features of concerned enterprises/installations in the covered sectors;
- b. propose the incorporating standards for the enterprises/installations in the covered sectors;
- c. draft *Incorporating Standards for the Enterprises/Installations under China ETS*

- d. organize seminars and consultations, invite comments and suggestions from the competent authorities, enterprises, and other third party institutions and experts; and
- e. revise and submit *Incorporating Standards for the Enterprises/Installations under China ETS* after incorporating the feedbacks.

1.6 TOR

Objective(s) and Rationale

Objective	Rationale
Analyze the major emission sources and their emission mechanism based on the covered sectors set in Building Block 2, then determine the types of compliant greenhouse gases in the participating sectors. Set the covered standards for enterprises/installations under the ETS. This section will consider the treatment methods for the covered enterprises/installations to participate in the project-based abatement trading.	See the main text

Deliverable(s)

Deliverable	Description	Party Responsible for Ensuring Action
(1) A research report on the scope of ETS (types of greenhouse gases, enterprises/installations); (2) <i>Covered Greenhouse Gases under China ETS</i> (proposed draft); (3) <i>Incorporating Standards for the Enterprises/Installations under China ETS</i> (proposed draft).	See the main text	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
A research report on the scope of ETS (types of greenhouse gases, enterprises/installations);	540	1.5 years
<i>Covered Greenhouse Gases under China ETS</i> (proposed draft);	540	1.5 years
<i>Incorporating Standards for the Enterprises/Installations under China ETS</i> (proposed draft).	540	1.5 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total
(1) Research into the scope under major ETSs overseas (types of greenhouse gases, covered enterprises/installations): a. on EU ETS, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism; b. on US RGGI, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism; c. on New Zealand ETS, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement					

<p>mechanism; d. on Australia ETS, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism; e. on other ETSs, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism; and f. find similarities and differences in the scope of above mentioned ETSs.</p>					
<p>(2) Research into the scope under the pilot ETSs in China: a. literature research into the scope of pilot ETS in China, including the types of greenhouse gases, emission characteristics, incorporated enterprises/installations, and the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism; b. field research into the CDM registered projects within the scope; and c. find similarities and differences in the scopes of the pilot ETSs.</p>					
<p>(3) <i>Deliver Covered Greenhouse Gases under China ETS</i> (proposal) a. identify types of greenhouse gases by the covered sectors, and emission characteristics; b. identify the types of greenhouse gases uncovered by the scheme but are permitted to use in offset mechanism and the abatement mechanism; c. draft <i>Covered Greenhouse Gases under China ETS</i></p>					

d. organize seminars and consultations, invite comments and suggestions from the competent authorities, enterprises, and other third party institutions and experts; and e. revise and submit <i>Covered Greenhouse Gases under China ETS</i> after incorporating the feedbacks.					
(4) Deliver <i>Incorporating Standards for the Enterprises/Installations under China ETS</i> (proposal) a. identify the types of features of concerned enterprises/installations in the covered sectors; b. propose the incorporating standards for the enterprises/installations in the covered sectors; c. draft <i>Incorporating Standards for the Enterprises/Installations under China ETS</i> d. organize seminars and consultations, invite comments and suggestions from the competent authorities, enterprises, and other third party institutions and experts; and e. revise and submit <i>Incorporating Standards for the Enterprises/Installations under China ETS</i> after incorporating the feedbacks.					
TOTAL BUDGET	300,000	200,000			500,000

Sources of Funding	Total (USD)
National Government	Not counted here. Please refer to the Building Block 8 Total budget for further information.
PMR	500,000
Other (if applicable)	0
Grand Total	500,000

2. Cap Setting

2.1 Background

For emissions trading, the most important prerequisite is to set emission caps for the covered emitters, which can be possible only when the total emission is known of the scheme as a whole or of the entire sector the emitter is from. The emission cap ensures the value of allowances, without which there are no theoretic grounds or practical incentives for emissions trading at all.

There are two types of scheme cap, an absolute cap or an intensity cap based on the quantity of production. Each of them has its own pros and cons. But generally, the absolute cap is more favorable for controlling a scheme's cap when an economy is on a climbing trajectory, but it increases the abatement cost. The intensity target helps control the cost when an economy is booming, and address some problems like over allocation and price collapse when the economy is waning. The majority of economists prefer an absolute cap. Because if the cap was framed in intensity terms, there would be uncertainty in the market about the number of permits available until after the GDP data for that year had been published.

From practical experiences, the emission caps of many schemes are not sufficiently stringent, especially at the initial stage of operation. There are several causes: a lack of historical data, uncertainties in predicting future emissions, overestimation of economic and emission growth under BAU scenarios, unpredictability of energy prices and underestimation of development and application of low carbon technology. As policy makers, governments tend to set caps relatively loose to accommodate economic growth and employment needs. This may cause over-allocation of allowances and price collapse, EU ETS has been criticized for this. To address the problem, there are some possible remedies, for instance, permitting allowance banking, setting a fixed carbon

price at the first stage of operation, allowing offset credits or allowances from other markets, setting an allowance price floor, and allocating allowances based on output.

When setting a cap, it requires a thorough research into the current emissions, precise prediction of future emission trends, and consideration of other carbon reduction related policy objectives.

2.2 Objective

The objective is to come up with a methodology for setting the emission cap for China's national emissions trading scheme (China ETS); and based on the methodology, provide a cap setting proposal for China ETS.

2.3 Deliverable(s)

(1) The Study Report on Methodology of Cap Setting for China ETS

(2) The Cap Setting Program for China ETS (Proposed Draft)

2.4 Research Methodology

Literature review, interviews, qualitative analysis and quantitative analysis are the major methodology employed in this part. This part starts with thorough literature reviews of ETS in order to get a theoretic grounding for the methodology of setting emission caps. Efforts are made further to study how foreign and domestic pilot schemes set their caps and analyze what experiences and lessons they have. Comparative analysis is introduced to identify China's gap in setting emission caps, and come up with a methodology, which helps produce a primary cap proposal for China ETS, and analyze its feasibility.

The following are proposed plans for specific research activities and their methodology.

2.4.1 Coordination with relevant policies.

Greenhouse gas is produced mainly through energy consumption and industrial processes. The amount of carbon emissions is closely related to how much fossil fuel is consumed and how many emission-intensive products are produced. Therefore, the policy of GHG controlling should couple with policies on restructuring of energy sector, energy conservation and emission reduction as well as the entire adjustment of industrial structure. Being a market instrument for emissions control policy, the ETS cap should be set coordinated with other related policy objectives.

This component goes in-depth into the synergy between these policies and development objectives, ways of achieving these objectives, affected sectors, and impact on the aggregate emissions. Based on these analyses, this project will come up with a reasonable scope for the ETS cap.

In addition to relative political targets, China's existing organizational structure of addressing climate change should be considered. To ensure the achievement of national objective, the central government has prescribed the control target for each province and each city, whose performance will be evaluated against these targets. This kind of administrative evaluation, familiar to both the central government and local governments, is very effective in China, as it was used in previous efforts to conserve energy, cut emissions, and control pollutants. As one part of China's climate policy package, the ETS cap setting should be carried out under the existing framework.

In order to promote the function of ETS in helping to achieve the GHG control target both at national and regional level, several options are considered here for ETS cap setting.

(1) Separate the national target into ETS part and non-ETS part at national level, directly allocate emission allowances to enterprises/installations at the national level. This option highly depends on the data basis, projection of future development and GHG emissions. It is really difficult to set an accurate cap for China, such a large

rapidly developing country. As this option does not address the problem of uneven development in China, it may decrease the flexibility of local governments. However, a uniform top-down mode at national level is more simple and efficient.

(2) Decompose the national GHG control target to local governments, maybe in intensity form. And then local governments divide their targets into ETS part and non-ETS part. The targets of provincial ETS parts accumulate to be the national ETS cap. This option gives local governments flexibility, but is likely to result in a loose national cap.

Cap setting and allowance allocation are two inseparable parts, the total amount of allowances allocated to enterprises/ installations should equal to the scheme cap. Take the national administration assessment mechanism into account, an option combines the two above options may also be considered.

(3) National government decides on the ETS inclusion criteria and allocation methods, giving some degree of flexibility to local governments. The flexibility could be provided through adjustment factors for free allowances, “new-entrants” set-aside proportion and other ways. And a reference cap will also be given at the national level based on the social-economic projections, emission projections, and abatement cost analysis, etc. Local governments will choose enterprises/installations based on national provision, conduct pre-allocation and submit their pre-allocation plans to the national competent authority. The pre-allocation plans will be coordinated with the reference cap at national level, in this way the scheme cap and allocation plan are determined.

All those above ideas are preliminary considerations based on current research, and further study is needed. Based on this line of thought, the following are some initial thoughts of cap setting procedure.

2.4.2 Principles and Procedures

While setting a cap for the ETS, results from both the “top-down” and “bottom-up” methods should be considered. The top-down method sets the cap by considering the emissions control target at the national level and the effects of other emissions control policies. The bottom-up method begins with allocating allowances to the covered entities in a prescribed manner, and gets the aggregates by adding all the allocated allowances together.

- Top-down method

First, the CO₂ emission reduction targets at the national level should be the fundamental base for setting the ETS cap. Such targets in China would include: reducing CO₂ intensity per unit GDP in 2020 by 40% to 45% less than that in 2005; 17% reduction of CO₂ intensity per unit GDP in the 12th FYP. Other policy objectives of emissions control and emission reduction potential of the covered entities should also be considered when determining the cap. A reference emission cap shall be set by decomposing the national targets on emissions control into the ETS.

Second, GHG control targets at the sub-national level should also be considered. ETS is only one of the policies of Chinese government to control GHG emissions. It is expected that under China ETS, the central government formulates covering standards and allowance allocation methods, while local governments execute the allocation of allowances and manage emissions of enterprises. Therefore, while determining the cap, policy targets at the sub-national level, and the situations of covered enterprises or installations should be considered. The scope of the total allowances for the covered entities in the jurisdiction shall be used as a reference in adjusting the national cap.

- Bottom-up method

First, key emitters are identified in accordance with the enterprise/installation coverage standards. Cost-benefit of including various emitters into the scheme will be analyzed

in order to determine the potential covered emitters. Local governments will allocate the allowances to the emitter in such a method as prescribed by the central government.

Second, the ETS caps at the local level are calculated by adding together all the allowances allocated to the covered entities. And the national cap is calculated by adding together all the local aggregates.

- Coordination of the results from the two methods

Compare the results from the bottom-up method with those from the top-down method, and analyze their differences. The competent authority at the national level will review the local allocation plans, and revise those that are inconsistent with the rules. Where the proposed ETS caps in certain provinces or cities are believed to be unreasonable (vary a lot from the reference), the national competent authority will make adjustments. With such adjustments, results from both methods will be more consistent.

The decision to adopt the model of “central government- local government- enterprises/installations” is based on China’s specific conditions. China is the second largest economy in the world, with all kinds of sectors. The number of covered enterprises/installations will be large in the future. It is not realistic to obligate national authorities to directly manage emissions from enterprises/installations. Therefore, it is suggested that the covered enterprises/installations under the scheme will be managed by the local authorities. The local governments compile the list of covered enterprises/installations, and allocate the allowances at the initial stage, whereas the central government prescribes the national standards for selecting the covered entities, provides allocation methods, and reviews and revises the allocation plans of the local governments. This is very similar to that of EU ETS Phase III, where the Commission decides the allocating methods, and member states allocate the allowances and submit to EU Commission for approval.

Generally, cap setting and allowance allocation are two relatively independent process. But the total amount of allocated allowances should be equal to the scheme cap, if they

are not matched, adjustments are needed accordingly. So the two processes are not completely independent. For China, emissions trading will be implemented under the background of carbon intensity target responsibility system, so leaving enough flexible policy option spaces for local governments is necessary. The territorial management mechanism may make the “bottom-up” characteristics more obvious, so the processes of cap setting and allowance allocation will be closely coordinated. .

A possible process for allowance allocation is as follows:

Top-down: National emission target → local emission targets;

Bottom-up: allocate allowances to the enterprises/installations by the local governments → ETS caps of local-level → review and revision of the local ETS caps by the central government → national ETS cap.

In the local pilot programs, all prefer to set an absolute cap under the ETS. However, in the future national scheme, there are maybe two options: an absolute cap or an intensity cap, and the experiences from pilot schemes will be taken. Whichever option will be taken, there will be a cap reference at the national level. It will be used for comparison and coordination with the cap results from the bottom-up method. Meanwhile, the central government will evaluate the performance of local governments in meeting the emissions control targets. In the evaluation, the results of cross-regional emissions trading should be considered as well, which might require some fine-tuning to the evaluation system.

After setting the primary ETS cap, more analysis has to be done on its impact on the socio-economy and on different sectors. Such analysis can be achieved through applicable economic models. Results from these models can be used as a reference in adjusting the cap.

As for the caps of ETS, there are short-term targets and long-term targets. The short-term target is used to determine the overall emission amount in each compliance

period, so as to provide reference for covered installations to set their compliance target. It is also a fundamental indicator to monitor whether the ETS has achieved its target. The long-term target provides a long-term price signal for the emissions trading market, and safeguards the incentives to enterprise for low-carbon investment, and provides a relatively stable carbon asset value amidst investment decision by an enterprise.

The short-term target should be more based on results from the bottom-up method, which are the aggregate of all the estimated allowances to be allocated to the covered entities. But there is not yet emissions monitoring and accounting system in China at the installations or enterprise level. Therefore, emission accounting methodology should be established firstly. And it is necessary to conduct a mapping exercise on the emission list of major emitters. Research into the technology that is employed and will be employed by these emitters is required, as well as analysis on their abatement costs. More still, research is required on the future expansion of the sectors, their overall abatement cost, and reduction potentials. See Diagram 2.

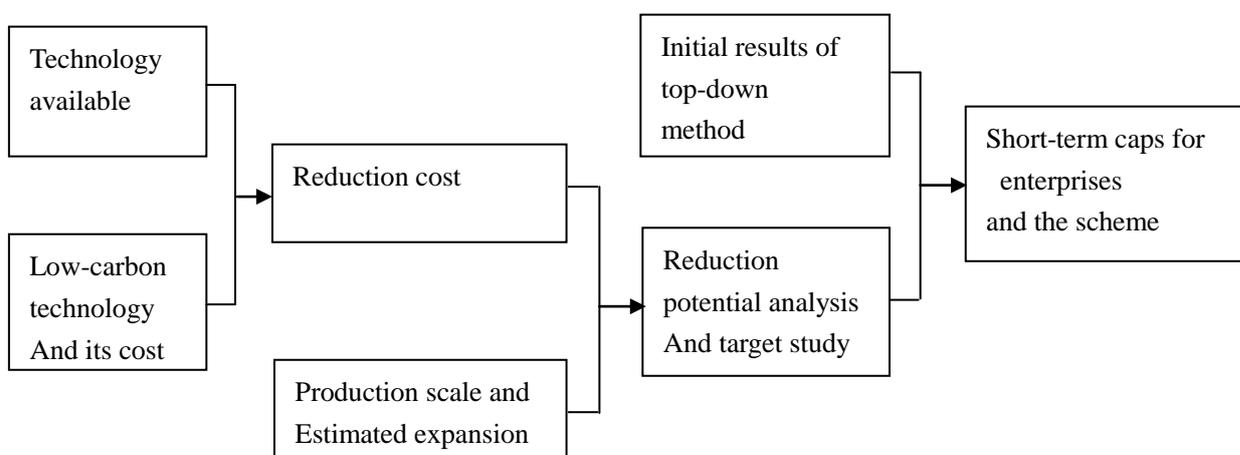


Diagram 2 procedure of setting a short-term target

When setting long-term targets, results from “top-down” method should be referred more. As uncertainties rise for long-term prediction of technological progress, the accumulation in bottom-up method will add more to such uncertainties. In view of the international practices, more often than not, countries have their own long-term reduction objectives. At the national level, such long-term objectives are kind of

political commitment, and ETS is one of the political instruments to honor this commitment.

2.4.3 Consideration of New Entrants

According to the coverage standard, installations are required to join in the scheme and fulfill compliance obligations only when they meet certain preset conditions (e.g. their installation capacity, production, and emissions). However, some of the installations may not meet the standard in the beginning of trading, but can meet it after some phase of development. Such installations are referred to as “new entrants”.

In jurisdictions where ETS are under operation, they would often consider the factor of new entrants, and reserve allowances for them in proportion. When the new entrants truly join in the scheme, the competent authorities can either auction these allowances or allocate them for free. Almost all the operating ETS are in developed countries. These countries have rather stable industrial structure, and relatively steady energy demand and productions in the energy-intensive sectors. It is thus much easier to predict how much production capacity and emissions will increase, as well as to determine the total emission target under the ETS.

Different from these developed economies, China is still on the trajectory of fast growing. China needs energy to shore up its economic and social development. Despite that China has endeavored to decouple the economic growth with energy consumption, it is still expected to see rising energy consumption and CO₂ emissions in the short run. Only from the 11th FYP development situation of major energy-consuming sectors in China, the average annual production growth rate of crude steel was 12.2%², cement

² Ministry of Industry and Information Technology of PRC, 12th five-year development plan of iron and steel industry

was 11.9%, flat glass was 10.5%³, etc. The demand growth of these high energy-intensity products would decline to some extent in the 12th FYP, but still at a high level. The average annual growth of cement and flat glass demand separately is expected to be 3.3% and 2.6%, and the average annual growth of total electricity consumption would be 7.5%-9.5%⁴. So the increased emissions will still be a great number.

Compared with the existing ETSs, China ETS will face an urgency to address these emission increments. First of all, China ETS will have to monitor the developments of covered sectors and their trends of CO₂ emissions, and consider these factors before setting caps for different stages. Second, it will have to know the production capacity plans of emitters (covered enterprises and installations). While setting the total emission target, China ETS can adopt the bottom-up method to get the estimated results of new entrants and consider their emission amount.

All in all, for the new entrants, the scheme will have to consider both the macro-trends of CO₂ emissions and the incremental emissions as a result of increasing capacity at the micro-level. It requires a lot of researches and analyses.

2.5 Research Activities

- (1) Research into methodology of setting caps in other ETSs both at home and abroad
 - a. theoretical study on the methodology of setting emission caps, and analyze the affecting factors and ways of analysis on these factors;

³ Ministry of Industry and Information Technology of PRC, 12th five-year development plan of building materials industry

⁴ China Electricity Council, Research report of 12th five-year development plan of power industry
<http://www.cec.org.cn/yaowenkuaidi/2012-03-09/81451.html>

- b. through literature review and interviews to understand the methodology of setting emission caps in overseas ETSs, and analyze the experience and lessons of setting caps;
- c. through literature review and interviews to research into the pilot programs in China, and understand their cap setting, design methodology, and their experience and lessons.

(2) Research into Chinese specifics in setting emission caps, including:

- a. China’s policies and programs on curbing greenhouse gas and on promoting low-carbon development;
- b. the emissions status, abatement cost and potential of China ETS covered entities;
- c. put forward a cap setting proposal for China ETS.

(3) Put forward The Proposal of Cap Setting for China ETS

- a. produce a report on methodology for setting a cap of China ETS;
- b. invite experts to give comments on the feasibility of the methodology;
- c. use top-down method to make a reference value of the cap of China ETS;
- d. analyze the socio-economic impacts of various emission caps;
- e. draft a primary proposal of cap setting for China ETS;
- f. invite experts to give comments on the feasibility of the proposal;
- g. complete The Cap Setting Program for China ETS (Proposal).

2.6 TOR

Objective(s) and Rationale

Objective(s)	Rationale
The objective is to come up with a methodology for setting the emission cap for China’s national emissions trading scheme (China ETS); and based on the methodology,	See the main text

provide a cap setting proposal for China ETS.	
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Deliverables

Deliverables	Description	Party Responsible for Ensuring Action
(1) The Study Report on Methodology of Cap Setting for China ETS (2) The Cap Setting Program for China ETS (Proposed Draft)	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
The Study Report on Methodology of Cap Setting for China ETS	540	1.5 years
Guidance on Allowance Allocation Methods for China ETS (proposed draft)	540	1.5 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total
(1) Research into methodology of setting caps in other ETSs both at home and abroad a. theoretical study on the methodology of setting emission caps, and analyze the affecting factors and ways of analysis on these factors; b. through literature review and interviews to understand the methodology of setting emission caps in overseas ETSs, and analyze the experience and lessons of setting caps; c. through literature review and					

interviews to research into the pilot programs in China, and understand their cap setting, design methodology, and their experience and lessons.					
(2) Research into Chinese specifics in setting emission caps, including: a. China’s policies and programs on curbing greenhouse gas and on promoting low-carbon development; b. the emission status, abatement cost and potential of China ETS covered entities; c. put forward a cap setting proposal for China ETS.					
(3) Put forward The Proposal of Cap Setting for China ETS a. produce a report on methodology for setting a cap of China ETS; b. invite experts to give comments on the feasibility of the methodology; c. use top-down method to make a reference value of the cap of China ETS; d. analyze the socio-economic impacts of various emission caps; e. draft a primary proposal of cap setting for China ETS; f. invite experts to give comments on the feasibility of the proposal; g. complete The Cap Setting Program for China ETS (Proposal).					
TOTAL BUDGET	400,000	300,000			700,000

Sources of Funding	Total (USD)
National Government	\$0
PMR	\$700,000
Other (if applicable)	\$0
Grand Total	\$700,000

3. Allowance Allocation

3.1 Background

A critical issue with political nature in ETS is how to distribute emission allowances to each covered entity based on the scheme's emission cap, i.e. initial allocation of allowances. Depending on whether it is charged or not, the initial allocation methods are divided into two categories: auction or free allocation. For free allocation, the data can be either from historical record (“grandfathering”) or from the actual data in relevant years (“updating”). The data basis used for allocation is either enterprise’ emission amount or their total input or output.

Theoretically, auctioning is the most fair and efficient allocation method, and it would not lead to any distortion in both allowance market and product market. Allowance auction does not need much historical data and its administration cost is also relatively low. The revenues from auction have a variety of uses, such as supporting low-carbon technology development, providing subsidy to consumers and reducing the distortion taxes. However auctioning usually faces strong political resistance since enterprises will have to undertake all the abatement cost. Therefore, current existing ETSs rarely wholly rely on auction in the initial stage. As for free allocation, grandfathering is an optimal choice under the total emission target because it will not distort the product market and the allowance market. Whether the allocation should be based on emission, output or input depends on the availability and reliability of data of the three types. Analyzing from economic perspectives, emission-based allocation is equivalent to subsidize emissions, while output-based allocation is equivalent to subsidize output.

EU ETS requires its member countries to abide by the following principals: consider the emission abatement potential; no discrimination against different vendors or sectors; special provisions for new entrants; take the contributions of the “early action” into consideration; listen to the public and list all vendors involved in the allocation and

their corresponding allowances.

At the same time, regulated entities under ETS include emission installation or related enterprises or groups. In general, it is necessary to allocate the allowance to emission installation, which means who owns the equipment can enjoy the allowance.

An important issue in the ETS is who will determine the scheme cap and allocate the allowances, which has been preliminary discussed in the part of “Cap Setting”. There are also some options for this issue: (1) the national competent authority determines a uniform allocation method, and directly allocate the allowances to covered entities/installations; (2) the central government firstly allocate allowances to local governments, then the local governments allocate to covered entities/installations, and the allocation methods are determined by local governments; (3) the allocation process is also “central government → local governments → covered entities/installations”, but the allocation method is determined by the central government, and some flexibilities are offered for local governments.

The reasons for the latter two options are the backgrounds of carbon intensity target responsibility system and territorial management mechanism. According to current research, one possible situation is that the GHG emissions of enterprises/installations will be under territorial management, i.e. the provincial government is responsible for regulating the enterprises/installations in its jurisdiction. The national competent authority will stipulate unified enterprise/installation inclusion criteria, as well as the allowance allocation methodology. There exist big differences in economic development and industrial structure in different areas in China, so some flexibility would be provided for local governments through different allocation factor adjustment scale. Local governments would make a pre-allocation based on the national provision, and then submit the pre-allocation results to the national competent authority, who would make some adjustment and decide the final allocation plan. It is to say that the national competent authority would stipulate the methodology and local governments

are responsible for implementation, as shown in Figure 7.

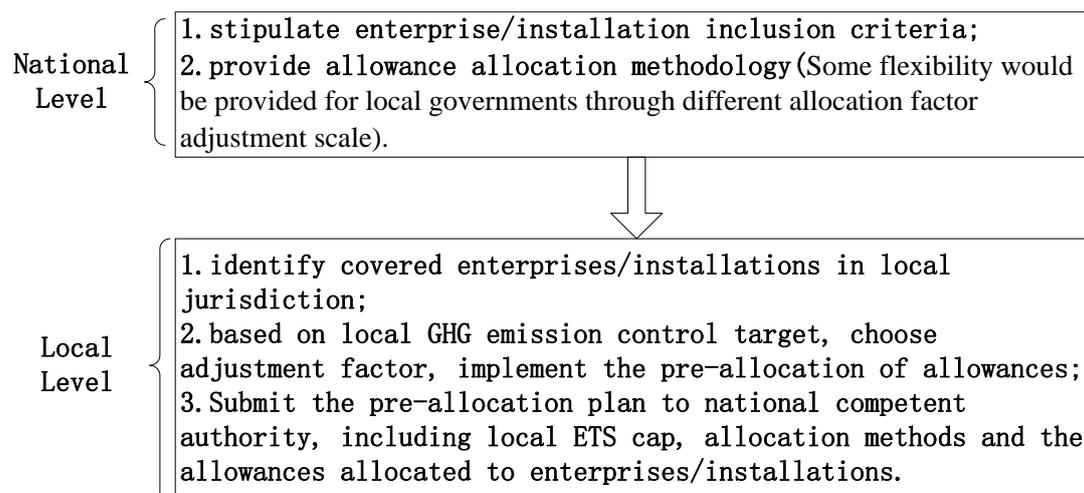


Fig.7 Possible allocation pattern in future China ETS

This is just a preliminary consideration based on current study, and future allocation method needs further in-depth study. Pros and cons of different options will be analyzed, as well as their feasibilities, problems that may occur during implementation and corresponding solutions. This section describes the research program of allowance allocation plan, and focus on methodology. The allocation process is related to cap-setting, and will be studied in the previous section.

3.2 Objective

Summarize the major factors associated with allowance initial allocation and allocation methods; based on the specific conditions of sectors and enterprises covered by China's ETS, put forward the methodology of initial allowance allocation.

3.3 Deliverable(s)

- (1) Report on the Study of Initial Allowance Allocation Methods in China ETS;
- (2) The Guidance of Initial Allowance Allocation Methodology in China ETS (Proposal).

3.4 Research Methodology

Researches are conducted through literature review, interview, qualitative and quantitative analysis, etc. Reviewing documentations of related theory on initial allowance allocation will help to understand the theoretic methodology of allocation. By investigating the plans of allowance allocation in operating ETS, practical experience and lessons are learnt from analyzing different allocation approaches. By analyzing China's real conditions, the gap of China in marketization degree, data basis and capability building is found out. Rational methodology of initial allowance allocation of China ETS is formulated in specific sectors and study on economic efficiency and feasibility. Specific research targets, thoughts and methods are introduced in the following segment.

3.4.1 Factors to Be Considered

First of all, allowance allocation should be supported by basic data. It is necessary to determine which period and which aspect the data is from (input, output or emission) as the basis of allocation. Selection of data should consider the data's availability, reliability and the monitoring cost. The program shall investigate the approaches of monitoring emission of main sectors such as heat, power, oil refinery, coking, cement, lime, pulp and paper and analyze the data's availability and reliability.

The marketization of major emitting sectors need to be considered for initial allowance allocation such as the actual situations of energy pricing mechanism, So as to diminish the distributional effect of allowance allocation and reduce market distortion. For example, consider the possibilities of solving the contradictions between "coal and electricity" through a well-designed allowance allocation plan.

Initial allowance allocation is a process of distributing interests which involves several stakeholders like government, sectors, enterprises and consumers etc. Their attitude should be taken into consideration while designed the methods. Relevant policies have

to be considered while allocating, consisting of economic development target of governments (gross economic target and economic restructuring etc.), environment targets (emissions target and controlling targets of other pollutants) and energy policies (including energy conservation policies and development policy for renewable energy etc.) in order to prevent the conflicts between allocation results and other policy targets. Other factors to be considered incorporate economic positions of sectors and enterprises, emission volume and its percentage in total emission of the society, comparison of emission intensity and advancement of technology, dominant emission abatement technologies, abatement potentials and cost, outlook of sectors and enterprises and political acceptability, etc. For consumers, the allocation plan should minimize the impact of GHG abatement policies on commodity prices.

Initial allocation of allowances is one segment of ETS. The cost of this segment is part of the generalized transaction cost for ETS. So this part of the cost should be minimized. The minimization requires analysis of the impacts of different allocation plans on compliance cost, monitoring cost, trading cost and distortion of product market.

Pursuant to auction and free approaches of allocation and principals of “grandfathering” and “updating”, the initial allowance allocation rules are set up according to the general principals based on input, output and emission data, in the first place. The second step is to obtain the specific methodology for covered entities to get allowance pertaining to above mentioned principals. The third step is to analyze the “distributional effect” of allocation plans, including the pressure of emission reduction for different sectors, the influence on upstream and downstream producers and consumers, impact of various plans on tax payers and the effect of stimulus for encouraging “early action”.

3.4.2 General Allocation Principals

3.4.2.1 Main Methods of Allowance Allocation

Initial allocation can be conducted for free or through auction depending on whether is charged or not. For the free allocation approach, the basic data can be historical data (“grandfathering”) or the actual data from the relevant year (“updating”), which are two principals of allocation. The data type can be emission, input or output of enterprises, which are three standards of allocation. Hence, in theory, free allocation can be divided into six types as shown in Tab.2. In practice, grandfathering, benchmarking and auctioning are mostly used in existing schemes. In-depth analysis of their feasibility and implementation operability in China will be done in this section.

Tab.2 Initial allocation methods of emission allowances

Standards Principals	Emission-based	Output-based	Input-based
Grandfathering	Emission-based grandfathering	Output-based grandfathering	Input-based grandfathering
Updating	Emission-based updating	Output-based updating	Input-based updating

3.4.2.2 Allowance Allocation Methods and Experiences of China ETS Pilot Program

As acknowledged, the seven provinces and cities carrying out pilot programs of carbon emissions trading mainly adopt “free allocation” method. Several pilots decide to auction a small proportion of allowances. Adopted methods for free allocation are either grandfathering or updating. There are several types of data, consisting of energy consumption, product output and historical emission data of a company. The impact of allocation methods on reaching total emission target in the region, on covered enterprises and on economic development of these areas needs to be further analyzed.

The research is conducted in the seven provinces and cities carrying out pilot programs

of carbon emissions trading for knowing their allocation plans and their specific considerations based on their unique features, analyzing the impact of allowance allocation on emissions trading and summarizing the experience and lessons in allocation process. When setting up a nation-wide emissions trading scheme, it is necessary to learn from the practice of seven provinces and cities, fully consider the specific conditions of different regions and sectors, to minimize the “distributional effect” of allocation and ensure fair and equitable allocation.

3.4.3 Allocation Methods at Sector-level

Entities involved in the emissions trading scheme usually have considerable potentials in emission reduction and are large-scale sources of emission in major emitting sectors whose emission data can be more easily obtained. Whereas, each major emitting sector has its own circumstances, including emission abatement technology and cost, gap in industrial technology compared with world advanced level, development outlook, government support and attitude, level of marketization and competition world-wide. For instance, the power sector in China confronts particular circumstances. Its coal consumption intensity and emissions intensity is comparatively low. Its marketization is not sufficient. Coal dominates its energy mix. The generation cost cannot be transferred to downstream. In the process of initial allowance allocation, these special features have to be considered for stimulating sector-oriented allocation methods.

If the allowance allocation is output-based or input-based, it is necessary to set up benchmarks which require to comprehensively analyzing the emissions intensity of involved sectors, to take the entities with best performance as benchmark for the sector and to design specific allocation methods. EU ETS adopts benchmarking for free allocation in Phase III, builds 52 product benchmarks as well as heat benchmark and fuel benchmark and identifies allocation methods for each product. Along with the development of emissions trading scheme in China, it is possible to assess the feasibility of setting up benchmarks in China; and attempt to set up a product

benchmark system in sectors with sufficient data, simple product structure and production technologies.

3.4.4 Complementary Mechanism (new entrants, opt-outs and early action)

Since different entities included in the scheme have their unique circumstances, besides working out a general allocation method, it requires to formulate complementary mechanisms for allowance allocation scheme targeting at these special features. For example, some enterprises rapidly expand their production scale and speed up their development, and their newly-increased production capacities are generally generated by advanced equipment with low emissions intensity. The allocation based on their historical product or emission data apparently cannot meet their future emission demand. In the other scenario, some companies phased out backward productivity but still enjoy original allocation based on historical data; thus they obtain excessive free allowance. Allowance allocation should be specially arranged considering these specific circumstances. Especially for China, which is at the stage of fast social and economic development, the scale of enterprises and change of productivities are more widely fluctuated compared with developed nations. It is harder for China to formulate related rules because of insufficient GHG emission data.

Generally speaking, output-based or input-based methods can solve the issues concerning new entrants and opt-outs. However, how to set up output-based or input based benchmarks rely on investigation in specific sectors and concrete standards of “entrance” and “exit”. All these problems need to be studied further.

Initial allowance allocation should take account of incentives for “early action” which refers to enterprises who take voluntary actions in emission reduction when the ETS has not been introduced or there are no stipulated targets for them. For the consideration of early action, it can be realized through forwarding historical benchmark period in which allowance allocation data is from, i.e. historical data should be prior to the period of early action. In this way, these enterprises can have benefit for their early action. But

on how to identify baseline period, it is necessary to consider factors from all aspects, such as the change of primary technologies in sectors, development of industrial scale and change of industrial emissions, etc.

3.4.5 Possible Options for China ETS and Some Preliminary Thinking

3.4.5.1 Regional Equity

The prime issue for setting a centralized national emissions trading market is to ensure stable economic growth and improvement of people's living standards while controlling GHG emissions. It is quite evident that economic development disequilibrium occurs in different regions in China. These regions show great disparities in terms of their economic level, industrial structure and energy mix, etc. The tertiary industry in more economically developed provinces and cities such as Beijing, Shanghai and Guangzhou accounts a pretty high proportion whose industrial sections are featured by advanced technology and relatively low energy-consumption and carbon emissions. However, provinces and cities in the middle and western areas are relatively backward in economic development. They still need to develop some sectors with high energy consumption and also high carbon emissions, so regional equity must be considered while breaking down the national GHG emissions control target into local areas and allocating emissions allowances.

In phase I and phase II of EU ETS, member countries determined their own cap and allowance allocation methods independently which were stated in the National Allocation Plan (NAP) and submitted to the European Commission for assessment. This separated mechanism with different allocation methods adopted by different countries lead to some problems. To establish a more unified market, from 2013, EU ETS Phase III stipulates an EU-wide emissions cap and centralized allocation method, i.e. "auction + benchmarking"; but the installation-based allocation is implemented by member states and the allocation results will be submitted to the European Commission for assessment. Learning from allocation experience of EU ETS and based on China's

practical conditions, one possible option is that the central government will design a unified cover criteria for enterprises/installation and corresponding allocation methods when a unified emissions trading market is set up. Local governments will conduct the enterprises/installation-based allowance allocation and submit the results to the relevant regulatory originations under central government for assessment.

At present, prime allocation methods employed by the international emissions trading scheme are: auction, output-based grandfathering and benchmarking. The latter two methods are means of free allocation. In the process of implementation, all methods have advantages and some issues to be settled. In light of current study, the following issues have to be solved at least when China adopts these methods.

3.4.5.2 Auctioning

Auctioning will not cause market distortions, needs less historical data, and has relatively low administration cost, so it is recommended by economists. However, the political acceptance of auctioning is relatively low, because enterprises will have to undertake all the abatement cost so they are under pressure of production cost rising. In addition, they have to take on stranded cost arising from policy change. According to the practice of operating emissions trading schemes, in order to alleviate companies' resistance, allocation for free is widely employed in the initial stage. Auction adopted in Phase I and Phase II of EU ETS in small-scale is for establishing and improving auction mechanism so that supervising bodies of governments, trading exchanges and involved entities can be familiar with auction rules and procedures. However, at the start of Australia's carbon pricing mechanism, auctioning is used as a dominant allocation method. China's seven emissions trading pilots choose free allocation as their main method, and auctioning as a supplement. Whether the future national ETS will auction allowances and what's the proportion of auctioned allowances still need further study.

3.4.5.3 Emission-based Grandfathering

Grandfathering does not cause distortions in allowance market and product market in theory, and can be applied easier in practice. Most existing schemes choose this method at the early stage of emissions trading, as well as domestic pilots. There are several issues to be settled while adopting the emission-based grandfathering:

(1) Historical Data

Emission-based grandfathering is based on the historical emission data of enterprises/installations. But in light of current statistics system in China, only the data of energy consumption at enterprises level is available. There is hardly any emissions data. Hence, the first task is to set up a complete carbon accounting system at enterprise/installation level for assessing emissions. The energy consumption data of power or heat plants above designated size at installation level is normally sufficient. Moreover, the emission of these enterprises is mainly from energy consumption, which is thus easier to account. But for sectors with huge amount of emission in the production process, such as cement or lime production, the energy consumption data of enterprises are not complete enough to calculate their emissions. Their total emissions in the process of production should be calculated according to output data. No matter through which means, it is very complicated to acquire historical data that is accurate, reliable and consistent.

(2) Phenomenon of “whip the fast and hardworking”

During the 11th Five-Year Plan Period, China implemented energy conservation policies such as “One Thousand Enterprises Energy Conservation Programme” and “Building Big, Closing Small” program which achieved good results. Some enterprises have made great efforts in improving their management mode and upgrading technology for energy conservation and reached advanced level in energy consumption. Hence, if the output-based grandfathering is adopted, it is necessary to have in-depth study on selection of time period of data and to consider the early actions taken by

enterprises to avoid whipping the fast and hardworking.

(3) Huge Pressure for Sectors under Price Control

Since the beginning of reform and opening up, China has gradually developed a market economic system. But for various reasons, some sectors are still in the low level of marketization, for example, the government decides the price and output of power and heat plants. These sectors cannot transfer their extra cost arising from emissions control to their downstream clients. These companies may face huge pressure if the allocation does not take their special conditions into account.

Take power sector as an example. Power sector accounts for 42% of total carbon emissions in China in 2009⁵, which is the largest share. During the 11th Five-Year Plan Period, domestic power plants have significantly lowered their energy consumption intensity after a “Building Big, Closing Small” program and eliminating backward productivity. The coal consumption level of some high-capacity super-critical or ultra-super-critical generating sets has reached world advanced level. There is little room for further technical development. Unlike power sectors in Europe that can get “windfall profit” under grandfathering method, Chinese power plants are under price control and planned power generation. They cannot adjust their cost through tariff increase or adjusting their generation plans. Pursuant to grandfathering, enterprises with higher efficiency usually get fewer allowances. Therefore, grandfathering alone will put excessive pressure on domestic power plants. PMR program includes a special sub-subject for studying the unique issues concerning China’s power sector. The study achievements will be taken as a reference for drafting an allocation plan for sectors under price control like power and heat.

⁵ Climate Policy Initiative at Tsinghua University, 2011, *Annual Review of Low-Carbon Development in China 2011-2012*, Social Sciences Academic Press (China).

3.4.5.4 Benchmarking

Grandfathering may cause problems like “whip the fast and hard working”, windfall profits, so benchmarking system is gradually developed in EU ETS, California’s ETS and some other schemes. Some of China’s domestic pilots also consider using benchmarks to determine the allowances for new entrants. There are some issues to be addressed while adopting benchmarking:

(1) Products Classification

Benchmark-based allowance allocation requires a rational and practical benchmark system which is established on the ground of product classification and specific benchmark for each type of product. China has a complete range of products and sophisticated production technologies and the carbon emissions of different technologies vary widely. For instance, chemical industry produces numerous kinds of products. Even for the same product, per unit energy use differs greatly. Per unit energy use for some sectors is comparable with world advanced level, but some are much worse. It is impossible to set up a benchmark for each specific kind of product; otherwise the scheme would be too complex. So firstly, it is necessary to classify products into groups. In accordance with experience of EU ETS and the carbon market in California, the products with similar per unit energy use in the same sector can be classified into one category. Products classification requires solid data and extensive investigation including production technology, installation, production output and emissions, etc.

(2) Full-industrial Data

Understanding the technology advancement and emission of a sector is the base for establishing the benchmarking system, including the data of emissions and production output. The benchmarks for phase III of EU ETS are set on the basis of the average of the top 10% most efficient installations in the EU. Unlike Europe, the top 10% most efficient installations in China may only account for a very small proportion of total

emissions. For a country on the fast track of industrialization, such benchmarking approach may be too tight. After clarifying the general emissions map of different kinds of products, we can draw an emission curve for each kind of product from low to high in terms of emissions intensity and observe the proportion of product emissions at each intensity level in total product emissions for identifying the emissions benchmark. Benchmarking puts higher requirements on data and is more complicated compared to grandfathering allocation. This program shall only analyze methodology and feasibility of benchmarking method for some sectors/products with solid data foundation.

(3) New Entrants

Since China is still in the process of rapid industrialization, it is quite common to expand the productivity of enterprises/installations. So it is critical to consider “new entrants” since the allowances for them will be much more than for developed nations’ new entrants in terms of volume and proportion. According to the experience of other countries, “new entrants” generally take the world advanced level as their benchmarks, and multiplied by their planned capacities to get their free allowances. However, economic development in different regions in China is quite imbalanced. The carbon intensities are lower in the eastern coastal provinces and cities which are in the process of adjusting economic structure and increasing the proportion of the tertiary industry. On the contrary, provinces and cities in the western area still need to develop industrial sectors with relatively high energy consumption and emissions in order to promote local economic development, improve people’s living standard and meet the demand of product markets no matter at home or abroad. Hence, it is quite complicated to set benchmarks for “new entrants”.

Problems concerning “new entrants” do not only exist in allowance allocation but also in the process of cap setting. It is also extremely complicated to predict the emissions of “new entrants”. It is unavoidable to further study it in light of China’s economic aggregate, imbalanced regional development in economy and complete range of

products.

Considering above situations, the amount of “new entrants” should be projected in further study, and regional development will also be taken into account. Some options concerning regional differences will be analyzed, like the set-aside proportion of allowances and benchmarks for new-entrants.

3.5 Major Research Activities

(1) Study the allowance allocation methods adopted by ETSs both at home and abroad and analyze their major considerations and experience

a. Theoretical research in initial allowance allocation methodology adopted by ETS; classify these methods from theoretical perspective, conduct micro-economic analysis for different methods and compare their pros and cons;

b. Through literature review and interviews, study the initial allowance allocation methods overseas, analyze and summarize their lessons and experience;

c. Conduct research in provinces and cities that carried out the pilot program of carbon emissions trading; and understand their situations, methodologies, rules, experience and lessons, etc.;

d. Through researches on theory and practice of initial allowance allocation for ETS, analyze the major consideration factors and their analytical methods;

(2) Study the specific conditions to be considered in China in the process of allowance allocation

a. Study the emissions monitoring methods for major emitting sectors such as power, heat, refinery, coking, lime, pulp and paper, etc. and analyze the availability and reliability of data;

b. Study the price controlling condition of major emission sectors in China, such as the pricing mechanism for products like oil, coal, natural gas and power, etc.;

c. Study the economic development goals of central and local governments (including economic aggregate volume, economic structure and adjustment, etc.), energy policies (including energy conservation policies and renewable energy policies, etc.) and other related policies;

d. Through literature review and interviews to study the economic positions of sectors and enterprises, emission volume and their percentage in total emission of the society, comparison of their emission intensity with advanced technologies, dominant carbon reduction technologies, emission abatement potentials and cost, outlook of sectors and enterprises and political acceptability, etc.

(3) Based on experiences at home and abroad and special conditions in China, propose allocation methodology that fits China’s conditions

a. Propose the initial allowance allocation methodology for China ETS;

b. Invite stakeholders from government, industry and consumers to give their opinions and advices on initial allowance allocation methods;

c. Invite experts to discuss the rationality and feasibility of the methodology of initial allowance allocation for China ETS and to offer suggestions and opinion;

d. Revise the allocation methodology after hearing opinion from different stakeholders and complete a Research Report on Methodology of Initial Allowance Allocation for China Emissions Trading Scheme.

(4) Complete The Guide of Initial Allowance Allocation Methodology in China ETS (Proposal)

3.6 TOR

Objective(s) and Rationale

Objective(s)	Rationale
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Analyze and summarize major considerations and allowance allocation methods; according the specific conditions of sectors and enterprises covered by China ETS, put forward the methodology of initial allowance allocation.	See the main text.
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Deliverables

Deliverables	Description	Party Responsible for Ensuring Action
(1) Research Report on Methodology of Allowance Allocation for China ETS (2) Guidance on Allowance Allocation Methods for China ETS (proposed draft)	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
Research Report on Methodology of Allowance Allocation for China ETS	720	2 years
Guidance on Allowance Allocation Methods for China ETS (proposed draft)	720	2 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total

<p>(1) Study the allowance allocation methods adopted by ETS at home and abroad and analyze major considerations and experience</p> <p>a. Theoretical research in initial allowance allocation methodology adopted by ETS; classify these methods from theoretical perspective, conduct micro-economic analysis for different methods and compare their pros and cons;</p> <p>b. Study the initial allowance allocation methods overseas by reviewing documentation and interviewing experts, analyze and summarize the lessons and experience in initial allowance allocation of ETS overseas;</p> <p>c. Conduct research in provinces and cities that carried out the pilot program of ETS; and acknowledge the situation, methodology, rules, experience and lessons etc. in initial allocation of allowance;</p> <p>e. Through researches on theory and practice of initial allowance allocation for ETS, analyze the considerations and their analytical methods.</p>					
<p>(2) Study the specific conditions to be considered in China in the process of allowance allocation</p> <p>a. Investigate the availability and reliability of data of major emitting sectors such as power, heat, refinery, coking, cement, lime, pulp and paper making etc.;</p> <p>b. Study the price control over major emitting sectors, including the pricing mechanism of energy like oil, coal, natural gas and power etc.;</p> <p>c. Study the economic development goals of central and local governments (including economic aggregate volume, economic</p>					

<p>structure adjustment etc.), energy policies (including energy conservation policy and policy on renewable energy etc.) and other related policies;</p> <p>d. Review documentation and visit on-site to know the economic positions of sectors and enterprises covered by China ETS, their emission volume and corresponding percentage in total emission in the society, comparison of emission intensity and advancement of technology, dominant emission reduction technologies, emission abatement potentials and cost, outlook of sectors and enterprises and political acceptability etc.;</p>					
<p>(3) Based on experience at home and abroad and real conditions in China, propose allocation methodology that fits China's conditions</p> <p>a. Propose the initial allowance allocation methodology for China ETS;</p> <p>b. Invite stake holders representing government, sector and consumers and listen to their opinion and advice on initial carbon allowance allocation methods;</p> <p>c. Invite experts to discuss the rationality and feasibility of the methodology of initial allowance allocation for China ETS and to offer suggestions and opinion;</p> <p>d. Revise the allocation methodology after hearing opinion from different parties and complete a Research Report on Methodology of Initial Allowance Allocation for China ETS.</p>					
<p>(4) Propose the Guidance on Allowance Allocation Methods for China ETS (proposed draft)</p>					
TOTAL BUDGET	400,000	300,000			700,000

Sources of Funding	Total (USD)
National Government	0
PMR	700,000
Other (if applicable)	\$0
Grand Total	700,000

4. Monitoring, Reporting and Verification (MRV) System

4.1 Background

China’s pilot emissions trading system (ETS) at local level is in the process of being designed and pushed ahead. Since the emissions permit is a virtual product, scientific and accurate monitoring, reporting and verification (MRV) on the actual emissions of enterprises/installation covered by ETS is not only an important measure of protecting the interests of participants but also a precondition and requirement consistently recognized by ETS. Therefore, ETS needs guidelines for emissions data collecting, verification and reporting. MRV system at enterprises/installation level is essential to insure the credibility of the system.

All ETSs in foreign countries have corresponding MRV systems. Establishing MRV system is not only a legal but also a technical issue. Strictly rules of emission monitoring are established for two monitoring methods: (i) measurement-based and (ii) calculation based. The first method is to install a continuous emission monitoring system (CEMS) in an emission source to monitor the emissions in real time; the second is to calculate emissions based on input of energy or raw materials or output of a company through setting specific emission factors or net calorific value etc. for different fuel or raw materials. Standard reporting contents and requirements in format are also included. Verifying a company’s emissions is to verify the volume and quality of emissions of participants in the ETS. In order to prevent it from changing to a “numbers game”, the third party organization should be introduced to verify a

company's emissions and submit the verification report to the regulatory bodies.

In light of experiences from overseas ETS, a complete ETS needs an MRV system for the following purposes:

(1) An MRV system is a primary support for the data source of ETS

In most sectors in China, especially the key emitting sectors like power, iron & steel and cement etc., there are challenges with regard to monitoring, such as insufficient emission data or applicable emission factor for calculation. For setting up an emissions trading market, it is necessary to understand the emission status of enterprises/installation, sectors/segments, and regions and state; scientifically and accurately monitor the actual emissions of enterprises/installation; and report and verify the volume for the purpose of confirming the emission data of enterprises/installation, sectors/segments, regions and state and providing basic data for establishing ETS.

(2) An MRV system facilitates enterprises to improve their monitoring and reporting capabilities

The monitoring and reporting system can be executed by covered enterprises. Regulatory bodies only need to provide related monitoring and reporting guidelines and requirements. Currently, the monitoring system of emissions in China does not have applicable calculation factors, hierarchy requirements and unified reporting content and format requirement, etc. But related data/information from ETS abroad, such as the calculation factors of IPCC or EU ETS may not be applicable to enterprises/installations in China. Hence, it is necessary to learn from the experience of ETS monitoring and reporting system overseas and to adopt comparatively simpler measures and estimation methods on the basis of balancing cost and benefits.

(3) An MRV system is essential for ensuring the fairness, accuracy and comparability of ETS

Verification process is for monitoring the accuracy of enterprises' monitoring and reporting of emissions, ensuring the authenticity of data, eliminating false data and decreasing monitoring costs. Study on verification systems can help regulatory bodies in China to standardize verification procedures, methods and organization to ensure not only the reliability of the verification opinion submitted by the third party but also the consistence, accuracy and comparability of verified emissions.

Since China proposes to gradually set up ETS, it is necessary to study the MRV systems in other ETSSs, analyze relevant experience, and investigate the experience and lessons of provinces and cities involving in the pilot ETS program. In order to ensure consistent, transparent and accurate emissions data and considering practicability and cost-effectiveness, establishment of MRV requires research in at least ETS participants and their responsibilities, choice of monitoring boundaries, methods and underlying principals, source of relevant factors, contents and format of reporting, as well as verification methods and requirements etc.

4.2 Objective(s)

Propose sector-specific *Guidelines on Monitoring, Reporting and Verifying Greenhouse Gas Emissions of Installations*

4.3 Deliverable(s)

- (1) sector-specific Guidelines on Monitoring Emissions from Installations (proposed draft);
- (2) sector-specific Guidelines on Reporting of Emissions from Installations (proposed draft);
- (3) sector-specific Guidelines on Verification of Emissions from Installations (proposed draft).

4.4 Research Methodology

4.4.1 Research Philosophy

Identify elements of the MRV system and propose sector-specific MRV Guidelines on Emissions from Installations.

(1) Monitoring, M

Monitoring activity can be conducted by operators of covered entities. Operators propose, in accordance with the monitoring guidelines, the monitoring plan for consideration and approval of regulatory bodies. Operators should consider the practicability and monitoring costs, and propose appropriate monitoring methods.

Study and summarize the experiences in monitoring emission in ETSs in EU, the United States, New Zealand, Australia and Japan etc., including laws and regulations, identification of the boundary for sector-specific emission source, selection of monitoring methodology and identification of calculation factors. Investigate the monitoring experience and problems of the provinces and cities involved in the pilot program and other additional issues to be considered in emissions monitoring and data management. The contents to be analyzed include:

a. How to select parameters to be monitored and monitoring methods suitable for China's specific circumstances?

Monitoring methods consist of measurement-based and calculation-based methods. Analyze the requirements of each method and the underlying philosophy and select the most appropriate monitoring methods for each type of entities.

b. According to emission status of enterprises/installation, analyze factors to be calculated as well as the emission sources to be monitored and corresponding monitoring frequency

For preventing the happen of “numbers game”, it is necessary to ensure the consistency

among guidelines, parameters and reporting and to analyze the permissible flexibility, including whether on-site measurement and default factors are allowed

c. Pursuant to the approach of managing data quality in China, analyze how the quality of emissions data is managed and requirements on uncertainties etc.

(2) Reporting, R

Reporting is implemented by covered enterprises/installations and its results will be delivered to the third party verifier for verification in accordance with related policies and guidelines formulated by relevant authorities.

This study will investigate and summarize the experience from ETSs in EU, the United States, New Zealand, Australia and Japan etc., in terms of contents to be reported and format requirements, analyze experiences and challenges of the provinces and cities involved in the pilot program in China, and study the key issues and requirements to be considered in the future reporting guidelines. The contents to be analyzed include:

a. Pertaining to the practice of energy reporting in China, analyze the requirements for reporting documents;

b. Reporting activity data could enhance the transparency and reliability of reported information, but the confidentiality of information of covered enterprises/installation should also be considered. Therefore, it is necessary to analyze information to be reported in addition to the emissions data;

c. reporting period

(3) Verification, V

Verifying emissions is generally conducted by independent third parties to provide reliable emissions. After verification, verifiers send the verification report to the operating entities, which could adjust their monitoring report accordingly and then submit both the verification report and the monitoring report to relevant authority.

Verification can be conducted based the current experience including the professional knowledge in finance, accounting, auditing or environmental auditing, etc. For the third party verifiers, they should be in line with recognized verifications standards. They should meet certain requirements.

This study will investigate and summarize the experience on verification from the ETSs in EU, the United States, New Zealand, Australia and Japan etc., analyze experiences and challenges on verification of the provinces and cities involved in the pilot program and propose verification guidelines for China ETS. The contents to be analyzed include:

- a. Specific requirements for verification and verifiers;
- b. Activities in the verification process including on-site inspection, systematic assessment and desk review;
- c. Accreditation of verifier;
- d. Payment of verification costs;
- e. Information confidentiality.

4.4.2 Research Methodology

(1) Literature Review

- a. Review existing verification methods for related sectors overseas, including 2006 IPCC Guidelines for National Greenhouse Gas Inventories, ISO 14064 Greenhouse Gas Accounting & Verification, and verification methodologies in other ETS;
- b. Investigate related basic data on greenhouse gas emissions in China, including National Communication on Climate Change, China Energy Statistical Yearbook, MRV requirements in pilot provinces and municipalities;

(2) Comparative Study

a. Compare and analyze the MRV systems of different ETSs, including selection of monitoring methods, relationship between hierarchy selection and costs, and introduction of transitional period etc.; and analyze the relationship between the selections of different countries and their corresponding industrial structure and energy mix etc.

b. Compare and analyze the gap between data demand and data availability in China.

(3) On-site Investigation

Conduct on-site investigation on establishment of MRV system in the pilot provinces and municipalities.

4.5 Activities

(1) Propose sector-specific Guidelines on Monitoring of Emissions from Installations (proposed draft)

a. Study and summarize the experiences in monitoring emission in ETSs in EU, the United States, New Zealand, Australia and Japan etc., including identification of the boundary for sector-specific emission source, selection of monitoring methodology and identification of calculation factors;

b. Investigate the monitoring experience and problems of the provinces and cities involved in the pilot program and statistical foundations of provinces and cities not involved in the pilot program;

c. Interview relevant experts to analyze statistic foundations of and data requirements for monitoring GHG emissions in China's ETS;

d. Identify the monitoring boundaries, GHG types and monitoring methods etc.; and complete the draft of Guidelines on Monitoring of Emissions from Installations;

e. Invite expert views on the draft and finalize Guidelines on Monitoring of Emissions from Installations (proposed draft);

(2) Propose sector-specific Guidelines on Reporting of Emissions from Installations (proposed draft)

a. Investigate the relevant experience in EU, the United States, New Zealand, Australia and Japan etc.;

b. Investigate the relevant experiences of pilot provinces and cities; and compare and analyze the similarities and differences regarding reporting requirements and contents in different ETSs;

c. Analyze the implication on the reporting contents and formats of energy conservation reporting system;

d. draft Guidelines on Reporting of Emissions from Installations;

e. seek stakeholder comments and finalize the Guidelines on Reporting of Emissions from Installations (proposed draft).

(3) Propose sector-specific Guidelines on Verification of Emissions from Installations (proposed draft).

a. Investigate and summarize relevant experience in EU, the United States, New Zealand, Australia and Japan etc.;

b. Investigate and summarize relevant experience in pilot regions;

c. Complete the draft Guidelines on Verification of Emissions from Installations;

d. seek stakeholder comments and finalize Guidelines on Verification of Emissions from Installations (proposed draft)

4.6 TOR

Objective(s) and Rationale

Objective(s)	Rationale
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Develop sector-specific MRV Guidelines on GHG Emissions from Installations (proposed draft)	See the main text.
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Deliverables

Deliverables	Description	Party Responsible for Ensuring Action
(1) sector-specific Guidelines on Monitoring Emissions from Installations (proposed draft); (2) sector-specific Guidelines on Reporting of Emissions from Installations (proposed draft); (3) sector-specific Guidelines on Verification of Emissions from Installations (proposed draft)	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
sector-specific Guidelines on Monitoring Emissions from Installations (proposed draft)	900	2.5years
sector-specific Guidelines on Reporting of Emissions from Installations (proposed draft)	900	2.5 years
sector-specific Guidelines on Verification of Emissions from Installations (proposed draft)	900	2.5 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total

<p>(1) Propose sector-specific Guidelines on Monitoring of Emissions from Installations (proposed draft)</p> <p>a. Study and summarize the experiences in monitoring emission in ETSs in EU, the United States, New Zealand, Australia and Japan etc., including identification of the boundary for sector-specific emission source, selection of monitoring methodology and identification of calculation factors;</p> <p>b. Investigate the monitoring experience and problems of the provinces and cities involved in the pilot program and statistical foundations of provinces and cities not involved in the pilot program;</p> <p>c. Interview relevant experts to analyze statistic foundations of and data requirements for monitoring GHG emissions in China's ETS;</p> <p>d. Identify the monitoring boundaries, GHG types and monitoring methods etc.; and complete the draft of Guidelines on Monitoring of Emissions from Installations;</p> <p>e. Invite expert views on the draft and finalize Guidelines on Monitoring of Emissions from Installations (proposed draft);</p>					
<p>(2) Propose sector-specific Guidelines on Reporting of Emissions from Installations (proposed draft)</p> <p>a. Investigate the relevant experience in EU, the United States, New Zealand, Australia and Japan, etc.;</p> <p>b. Investigate the relevant experiences of pilot provinces and cities; and compare and analyze the similarities and differences regarding reporting requirements and contents in different ETSs;</p> <p>c. Analyze the implication on the reporting contents and</p>					

formats of energy conservation reporting system; d. draft Guidelines on Reporting of Emissions from Installations; e. seek stakeholder comments and finalize the Guidelines on Reporting of Emissions from Installations (proposed draft).					
(3) Propose sector-specific Guidelines on Verification of Emissions from Installations (proposed draft). a. Investigate and summarize relevant experience in EU, the United States, New Zealand, Australia and Japan etc.; b. Investigate and summarize relevant experience in pilot regions; c. Complete the draft Guidelines on Verification of Emissions from Installations; d. seek stakeholders comments and finalize Guidelines on Verification of Emissions from Installations (proposed draft)					
TOTAL BUDGET	500,000	500,000	230,000		1,230,000

Sources of Funding	Total (USD)
National Government	0
PMR	1,230,000
Other (if applicable)	2,000,000 (from Norway through UNDP)
Grand Total	3,230,000

5. Registry

5.1 Background

In order to implement and accurately monitor a national wide ETS and understand the situation of emission allowance trading among participants and allowances held by participants, it is required to set up and build a national registry to register the emission reduction volume, record and track holding, transfer and cancellation of emission

reduction volume, safeguard the fairness, openness, justice and transparency of trading in the market and form a centralized information disclosure platform and standardized trading varieties. Study, design and build a trading registry as perfect, reasonable and safe as possible and provide necessary back-office support required for carrying out emissions allowance trading activities. Under such background, “Design and Establish National Voluntary Emission Reduction Project Registry and National Registry for ETS” is covered in the cooperative program to be carried out between National Development and Reform Commission (NDRC) and United Nations Development Programme (UNDP). The program is now under implementation. Meanwhile, seven pilot regions in China are actively developing or have preliminarily set up their own registries. Therefore, how to balance or select the registry at local level and at the national level will be an important issue in the process of establishing China ETS.

According to the related experience of other countries, EU is facing a similar situation as China. On July 14, 2010, experts from 27 member countries of EU unanimously voted for the plan of phase three of emissions allowance trading. Phase three (2013-2010) will adopt a union registry within EU for allowance trading. However, previously, member countries all have their own registry platforms. Since the design and security standards of the member countries are different, it was a key issue faced by EU in the short term about how to coordinate or consolidate the registries of member countries into a union registry.

In this research, it is not planned to carry out study in specific plans for the national voluntary emission reduction project registry and national registry, but to focus on discussing the relations between setting up a national registry and local registries, and ensure that the ETS can be smoothly transferred and implemented using limited resources rationally. If there is only one national registry and no need for local-level registries, the meaning of the pilot ETS program in local areas is to provide more references. Local governments in these areas put considerable human, material and financial resources to establish local registries which will be abandoned in the future. If

the registry at the national level and local levels exist concurrently, the question is how to ensure the pilot program can be effectively linked to the national system. In addition, areas not involved in the pilot program also have to put considerable human, material and financial resources to develop their own registries. There are advantages and disadvantages in both options. And this would be partly dependent on the responsibilities distribution of the authorities. So it is necessary to conduct systematic study to answer to the question if local registries can be functional effectively and what functions they have.

5.2 Objective(s)

Analyze and identify the relations between the national registry and local registries, including:

- (1) Whether local areas need to establish independent registry, and
- (2) If local areas need to do so, clarify the positioning and functions of registries at both national and local levels. If local registry is not needed, identify the functions of relevant local organizations in the operation of national registry.

5.3 Deliverable(s)

- (1) Research Report on the Relations between National Registry and Local Registries;
- (2) Framework Plan of China National Registry (proposed draft).

5.4 Research Methodology

- (1) Through documentation review and expert interview, investigate the registries at abroad and especially focus on the union registry of EU ETS and national registries of member countries; follow up and study the relations between registries of member countries and the union registry, and figure out the functions of member countries in the operation of the unified registry of EU;

(2) Through follow-up and investigation, analyze the applicable plans for China national registry;

(3) Through investigation on-site and expert interview, summarize the experience of areas involving in the pilot program and analyze the general structure, major functions and relative implementation mode, data and information operating system, account management, monitoring of trading, information disclosure, reporting system and other related segments of registries at local level in China;

(4) Through comparison and study, summarize the differences and similarities as well as possible links between national registry and local registries;

(5) Through documentation review and expert interview, analyze the relations between the national registry and local registries.

5.5 Activities

(1) The study focuses on the unified registry of EU and registries of member countries and analyzes their relations.

a. Investigate the registry of ETS oversea, especially the unified registry of EU and registries of member countries;

b. Through follow-up and investigation, study and analyze the unified registry of EU and registries of member countries;

c. Study the functions of member countries in establishing a unified registry;

d. Complete the Report on Relations between the EU Union Registry and Registries of Member Countries.

(2) Investigate the national registry and local registries in areas involving in the pilot program and conduct comparative study;

a. Through follow-up and investigation, investigate and analyze the applicable plans for

China national registry;

b. Through on-site investigation and expert interview, summarize the experience of pilot areas and analyze the general structure, major functions and relative implementation mode, data and information operating system, account management, monitoring of trading, information disclosure, reporting system and other related segments of registries at local levels in China;

c. Through comparison study, summarize the differences and similarities as well as possible links between national registry and local registries;

d. Complete the Comparison Research Report on National Registry and Local Registries.

(3) Analyze the relations between national registry and local registries.

a. Analyze whether local areas need to establish independent registry;

b. If local areas need to do so, clarify the positioning and functions of local registry;

c. If local registry is not needed, identify the functions of relevant local organizations in the operation of national registry;

d. Consult organizations in charge, enterprises, the third party organizations and experts for opinion and suggestions;

e. Propose a draft of the Framework Plan of China National Registry;

f. Hold symposium and review and improve the draft according the opinion and suggestions of experts;

g. Complete the Framework Plan of China National Registry (proposed draft).

5.6 TOR

Objective(s) and Rationale

Objective(s)	Rationale
Analyze and identify the relations between the national registry and local registries, including: do local areas need to establish independent registry? If local areas need to do so, clarify the positioning and functions of registry at both the national and local levels. If local registry is not needed, identify the functions of relevant local organizations in the operation of national registry.	See “Background” in the text.

Deliverables

Deliverables	Description	Party Responsible for Ensuring Action
(1) Research Report on the Relations between National Registry and Local Registries; (2) Framework Plan of China National Registry (proposed draft)	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
Research Report on the Relations between National Registry and Local Registries;	720	2 years
Framework Plan of China National Registry (proposed draft)	720	2 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total

<p>(1) The study focuses on the unified registry of EU and registries of member countries and analyzes their relations.</p> <p>a. Investigate the registry of ETS oversea, especially the unified registry of EU and registries of member countries;</p> <p>b. Through follow-up and investigation, study and analyze the unified registry of EU and registries of member countries;</p> <p>c. Study the functions of member countries in establishing a unified registry;</p> <p>d. Complete the Report on Relations between the EU Union Registry and Registries of Member Countries.</p>					
<p>(2) Investigate the national registry and local registries in pilot regions and conduct comparative study;</p> <p>a. Through follow-up and investigation, investigate and analyze the applicable plans for China national registry;</p> <p>b. Through on-site investigation and expert interview, summarize the experience of areas involved in the pilot program and analyze the general structure, major functions and relative implementation mode, data and information operating system, account management, monitoring of trading, information disclosure, reporting system and other related segments of registries at local levels in China;</p> <p>c. Through comparison study, summarize the differences and similarities as well as possible links between national registry and local registries;</p> <p>d. Complete the Comparison Research Report on National Registry and Local Registries.</p>					
<p>(3) Analyze the relations between national registry and local registries.</p>					

a. Analyze whether local regions need to establish independent registry; b. If local areas need to do so, clarify the positioning and functions of local registry; c. If local registry is not needed, identify the functions of relevant local organizations in the operation of national registry; d. Consult organizations in charge, enterprises, the third party organizations and experts for opinion and suggestions; e. Propose a draft of the Framework Plan of China National Registry; f. Hold symposium and review and improve the draft according the opinion and suggestions of experts; g. Complete the Framework Plan of China National Registry (proposed draft).					
TOTAL BUDGET		100,000	100,000		200,000

Sources of Funding	Total (USD)
National Government	5,000,000 (construction of backup system)
PMR	200,000
Other (if applicable)	2,900,000 (from Norway through UNDP)
Grand Total	8,100,000

6. Compliance Mechanism

6.1 Background

Compliance mechanism is to evaluate if participants in the market meet obligations and related rules for the consequences which participants have to face if they couldn't. It is rather critical for promoting enterprises to meet their obligations. Generally speaking, Compliance mechanism is that participants in the market must surrender the same amount of allowances equivalent to their emissions in a prescribed period of time. The emission exceeding the allowance held by participants shall be penalized by regulatory organizations and participants have the obligation for making up the shortfall in the

following year. The stipulated time period is a key factor for the compliance mechanism: compliance period. Compliance period refers to the duration from the time of allowance allocated to the time of allowance surrendered to the regulatory organization, usually lasting for a year or a couple of years. Having a longer compliance period, participants could adjust use of allowance according to the circumstances of different years, mitigate the price fluctuation of allowance and decrease the reduction cost. Having a shorter compliance period, for example one year, emission reduction can be achieved in a short period of time and it is easier for governors to set allowance cap for the next phase of ETS.

For most of the ETS overseas, considering the operation and management of enterprises, the compliance period is generally to be set as a year. But countries set different penalty mechanisms according to each own actual conditions. For instance, the enterprises covered by RGGI who fail to meet obligations, have to surrender three times of due allowance in the next compliance period. In NZ ETS, due allowance is required to be made up together with penalty which is set at NZ\$30-50 fine per tonne; or the due allowance should be surrendered by twice as much. In California ETS, if an enterprise's emission exceeds allocated allowance, it will be heavily penalized. The amount of the penalty can refer to the related applicable mandatory mechanisms, such as Health and Safety Code. In South Korea ETS, if an enterprise fails to reach the obligations, it shall pay penalty which maximally triples the market price per tonne (minimally triples market price at the beginning, up to 100 thousand KRW). For enterprises in EU ETS who fail to meet their obligations, as stipulated by European Commission, in trial operation period, each tonne of excessively emitted CO₂ shall be fined 40 euro; in normal operation period, the penalty rises to 100 euro per tonne (as EU ETS believes, reasonable emissions credits price is from 20 to 50 euro); moreover, the excessive emission will be deducted from the allowance permit for the following year. On one hand, the penalty mechanism will raise the violation cost for enterprises in order to push them to meet obligations; on the other hand, reasonable offset mechanism and

certain violation cost can effectively protect participated enterprises and encourage them to join in.

If China is going to set up a compliance mechanism, the key issue is to identify a penalty mechanism. In order to formulate a penalty mechanism that is suitable for China's conditions, it is required to clarify the format of penalty, accommodate the legal foundations for existing laws and regulations and future penalty mechanism, choose reasonable penalty scale, coordinate relations between the state and local areas and consider the actual operation capabilities of regions and enterprises. In the process of stipulation, some specific issues have to be solved. For example, China lack legal foundation for compliance mechanism, while other countries have relative legal document before ETS is launched. Take EU ETS for example, its penalty mechanism is based on EU ETS Directive which is announced by European parliament. From international experience, penalty mechanism is usually set in the form of fine. However, China has some obstacles to fine those non-compliance enterprises. At present, China does not have sufficient legal or institutional support for allowance violation fine. From the experience of local pilot ETS design, local government couldn't set effective penalty mechanism as they lack sufficient permissions. As presented in the Law of the People's Republic of China on Administrative Penalty, it is announced that if legal and administrative regulations for violations have been made to administrative penalties, and local laws and regulations need to make specific provisions, the provisions should accord with behavior, the type and amount in the laws and administrative regulations. However, the amount of penalty set in the laws and administrative regulations is relatively low. Even for developed provinces like Shanghai, the amount is around 100 thousands Yuan. Secondly, even if the penalty can exist in the form of fine, it is hard to decide what kind of organizations can identify and enforce the violation fine. Although central and local administrative organizations have similar structure and functions, their specific work diversifies. Therefore, a unified structure of compliance organizations must be clarified for the state and local areas. Whether a third party

organization should be introduced or not needs to be confirmed. Thirdly, it is difficult to set a penalty cap or penalty rate. There is delicate balance between the level of penalty and incentives. A compliance penalty in practice acts as a “price ceiling” in an ETS: if the market price exceeds the penalty rate, then emitters will choose not to comply with the permit obligation, and emissions will exceed the amount of permits. The penalty cap or rate usually lies on CO₂ abatement cost curve of various technologies. But China is a developing country, different regions and different sectors have great disparities in technology level. Hence, a lot of investigations are required to be conducted at local level in order to acknowledge the CO₂ abatement cost curve in different areas and sectors. More, if compliance penalty rate between different regions are different from each other or the same should be tested in analysis. And if possibly institutionally, it may be most usefully implemented as part of the permit system: if a company does not hand in permits to cover its assessed emissions, it simply gets sent a bill for payment of the compliance penalty, and it also has the obligation for making up the shortfall in the following year which shall be completed. Lastly, a key issue is how to manage the fine. It must be clarified if the fine should be put in the central treasury, special accounts of the central government, local treasury or special accounts of the local government. How to use relative fine needs to be defined. Besides, since China has “Five-year Plan” for state and local governments, while designing compliance rules, it must be considered if allowance can be banked or borrowed during two planning periods; and whether evaluation of “carbon intensity reduction target” for local governments is based on actual emission of enterprises or on the emission after carbon allowance is banked or borrowed.

In summary, in light of related practices and experiences, reasonable compliance mechanism is critical for stimulating enterprises to meet their corresponding emission reduction obligations, protecting the enthusiasm of compliance enterprises and facilitating completion of overall emission reduction targets. For ensuring the implementing of China ETS, a compliance mechanism will be formulated according to

the actual demands of China, such as the compliance cost and emission reduction targets and so on.

6.2 Objectives

Identify key issues for a compliance mechanism for ETS, summarize the experience of ETS pilot program in local areas and relevant pollution-discharge right trade, and propose a compliance mechanism for China ETS including structural arrangement, compliance period, compliance rules and penalty mechanism etc.

6.3 Deliverable(s)

(1) The Research Report on the Compliance Mechanism of ETS covers:

- a. Study on compliance mechanism of ETS overseas;
- b. Study on the compliance mechanism of the ETS pilot program in local areas in China;
- c. Study on relevant pollution-discharge right trade in China.

(2) Plan for the Compliance Mechanism for China ETS (proposed draft).

6.4 Research Methodology

(1) Through documentation review and expert interview, investigate the compliance mechanism of ETS overseas, such as EU ETS, RGGI, NZ ETS, California ETS, and Australia's Carbon Pricing Mechanism etc.; and summarize and analyze important issues to be considered, such as institutional arrangement, compliance period, compliance rules, offset mechanism and penalty mechanism etc.;

(2) Through documentation review and expert interview, investigate the experience, problems and difficulties in the process of evaluating relevant pollution-discharge right trade in China, such as SO₂ ETS;

- (3) Through investigation on-site, summarize and analyze the experience of the ETS pilot program in local areas, and find out the successful experiences, common issues and other obstacles of compliance mechanism;
- (4) Through documentation review and expert interview, discuss and define relative legal foundation for compliance mechanism.
- (5) Through documentation review, investigate the conditions of ETS market in China, obtain emission abatement cost of large size enterprises in key emission-intensive sectors and analyze their compliance cost;
- (6) Through scenario analysis, under different compliance periods settings, analyze the impact of different compliance periods on reaching CO₂ emission reduction targets in China and in local areas, and identify a compliance period for China ETS;
- (7) Analyze the influence of different compliance mechanisms on China ETS and propose a compliance mechanism for China ETS, including institutional arrangement, compliance period, compliance rules, offset mechanism and penalty mechanism etc.

6.5 Activities

- (1) Investigate the compliance mechanism of ETS overseas and identify important issues in the compliance mechanism;
 - a. Investigate the compliance mechanism of ETS overseas, such as EU ETS, RGGI, NZ ETS, California ETS, Australia's Carbon Pricing Mechanism etc.;
 - b. Investigate the legal foundation of compliance mechanism of ETS overseas, such as EU ETS, RGGI, NZ ETS, California ETS, Australia's Carbon Pricing Mechanism etc.;
 - c. Organize experts to discuss important issues in the compliance mechanism, such as institutional arrangement, compliance period, compliance rules, offset mechanism and penalty mechanism etc.;
 - d. Summarize key issues concerning compliance mechanism;

- e. Complete a Research Report on the Compliance Mechanism of ETS Overseas.
- (2) Investigate the mechanism of evaluating relevant pollution-discharge right trade and the ETS pilot program in local areas in China; and summarize and analyze the experience and challenges for stipulating a compliance mechanism for China ETS.
- a. Investigate the mechanism of evaluating relevant pollution-discharge right trade in China, such as SO₂ ETS;
 - b. Organize experts to discuss problems and difficulties faced by the mechanism of evaluating relevant pollution-discharge right trade in China;
 - c. Inspect on-site the ETS pilot program in local areas;
 - d. Organize experts to discuss successful experiences, common issues and other obstacles of the compliance mechanism of ETS pilot program in local areas;
 - e. Summarize and analyze the experience and challenges for stipulating a compliance mechanism for China ETS;
 - f. Complete a Research Report on the Compliance Mechanism of the ETS Pilot Program in Local Areas in China;
 - g. Complete a Research Report on the Mechanism of Evaluating Relevant Pollution-Discharge Right Trade in China.
- (3) Propose a compliance mechanism for China ETS.
- a. Discuss and define relative legal foundation for compliance mechanism;
 - b. Investigate the conditions of ETS market in China, obtain emission abatement cost of large size enterprises in key emission-intensive sectors and analyze their compliance cost;
 - c. Analyze the compliance cost for different types of enterprises;
 - d. Analyze the impact of different compliance periods settings on reaching CO₂

emission reduction targets in China and in local areas;

- e. Analyze the influence of different compliance mechanisms on China ETS;
- f. Consult organizations in charge, enterprises, the third party organizations and experts for opinion and suggestions;
- g. Propose a preliminary plan for the compliance mechanism for China ETS;
- h. Hold symposium and review and improve the preliminary plan according the opinion and suggestions of experts;
- i. Complete the Plan for the Compliance Mechanism for China ETS (proposed draft).

6.6 TOR

Objective(s) and Rationale

Objective(s)	Rationale
Identify key issues for a compliance mechanism for ETS, summarize the experience of ETS pilot program in local areas and evaluation of relevant pollution-discharge right trade and propose a compliance mechanism for China ETS including structural arrangement, compliance period, compliance rules and penalty mechanism etc.	See the main text.

Deliverables

Deliverables	Description	Party Responsible for Ensuring Action
(1) Research Report on the Compliance Mechanism of ETS (2) Plan for the Compliance Mechanism for China ETS (proposed draft)	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
Research Report on the Compliance Mechanism of ETS	720	2 years
Plan for the Compliance Mechanism for China ETS (proposed draft)	720	2 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total
(1) Investigate the compliance mechanism of ETS overseas and identify important issues in the compliance mechanism. a. Investigate the compliance mechanism of ETS overseas, such as EU ETS, RGGI, NZ ETS, California ETS, and Australia's Carbon Pricing Mechanism etc.; b. Investigate the legal foundation of compliance mechanism of ETS overseas, such as EU ETS, RGGI, NZ ETS, California ETS, Australia's Carbon Pricing Mechanism etc.; c. Organize experts to discuss important issues in the compliance mechanism, such as institutional arrangement, compliance period, compliance rules, offset mechanism and penalty mechanism etc.; d. Summarize key issues concerning compliance mechanism; e. Complete a Research Report on the Compliance					

Mechanism of ETS Overseas.					
<p>(2) Investigate the mechanism of evaluating relevant pollution-discharge right trade and the ETS pilot program in local areas in China; and summarize and analyze the experience and challenges for stipulating a compliance mechanism for China ETS.</p> <p>a. Investigate the mechanism of evaluating relevant pollution-discharge right trade in China, such as SO₂ ETS;</p> <p>b. Organize experts to discuss problems and difficulties faced by the mechanism of evaluating relevant pollution-discharge right trade in China;</p> <p>c. Inspect on-site the ETS pilot program in local areas;</p> <p>d. Organize experts to discuss successful experiences, common issues and other obstacles of the compliance mechanism of ETS pilot program in local areas;</p> <p>e. Summarize and analyze the experience and challenges for stipulating a compliance mechanism for China ETS;</p> <p>f. Complete a Research Report on the Compliance Mechanism of the ETS Pilot Program in Local Areas in China;</p> <p>g. Complete a Research Report on the Mechanism of Evaluating Relevant Pollution-Discharge Right Trade in China.</p>					
<p>(3) Propose a compliance mechanism for China ETS.</p> <p>a. Discuss and define relative</p>					

<p>legal foundation for compliance mechanism;</p> <p>b. Investigate the conditions of ETS market in China, obtain emission abatement cost of large size enterprises in key emission-intensive sectors and analyze their compliance cost;</p> <p>c. Analyze the compliance cost for different types of enterprises;</p> <p>d. Analyze the impact of different compliance periods settings on reaching CO₂ emission reduction targets in China and in local areas,;</p> <p>e. Analyze the influence of different compliance mechanisms on China ETS;</p> <p>f. Consult organizations in charge, enterprises, the third party organizations and experts for opinion and suggestions;</p> <p>g. Propose a preliminary plan for the compliance mechanism for China ETS</p> <p>h. Hold symposium and review and improve the preliminary plan according the opinion and suggestions of experts;</p> <p>i. Complete the Plan for the Compliance Mechanism for China ETS (proposed draft).</p>					
TOTAL BUDGET		100,000	100,000		200,000

Sources of Funding	Total (USD)
National Government	Not counted here. Please refer to Building Block 8 Total Budget for further information.
PMR	200,000
Other (if applicable)	0
Grand Total	200,000

7. Price Containment Mechanism

7.1 Background

Rational and stable allowance price represents effective operation of ETS. Stable allowance price shall encourage enterprises to invest in low-carbon for a longer term, promote R&D and application of low-carbon technologies and boost the transition of socio-economic development to low-carbon oriented. In order to maintain the stability of the allowance market, the factors to be considered in designing an ETS include functional design of the trading platform, selection of and restraint on participants in the market, arrangement of trading period, establishment of regulation mechanism and design of price containment mechanism etc.

For the purpose of maintaining the stability of the allowance market, price containment mechanism is one of the supplementary mechanisms considered by many ETSs. Setting a price cap can avoid over-high allowance cost which may unduly affect economic development in local areas. Setting a price floor is to offer a price signal for enterprises to engage in low-carbon investments in the longer term and reduce more emission when the abatement cost is comparatively low. The allowance price ceiling and floor help to mitigate fluctuations in the market and keep the stable development of carbon market. It is especially critical in the initial stage of ETS.

7.2 Objective

For keeping the price of China ETS at a stable level, analyze if it is necessary to implement a price containment mechanism in China ETS, study the feasibility and then propose a plan of implementing price containment mechanism in China ETS.

7.3 Deliverable(s)

(1) Research Report on Price containment Mechanism in ETS;

(2) Plan of Implementing a Price Containment Mechanism in China ETS (proposed draft).

7.4 Research Methodology

Major research methods adopted in the part are literature review, interview, qualitative and quantitative analysis etc. First of all, understand the functions and design of the price containment mechanism from practice and theory perspectives through literature review. Secondly, Then analyze the rationality and feasibility of implementing a price containment mechanism in China ETS. Thirdly, if a price containment mechanism is adopted in China ETS, analyze how to set price ceiling and floor, some modeling analysis will be conducted in this part. Lastly, propose the possible organizations and procedures of implementing the price containment mechanism if it is adopted by China ETS to adjust price.

7.4.1 Study the Necessity of Price Containment

Introduction of a price containment mechanism in ETS means: under the set price ceiling and floor of allowances, when the market price reaches the ceiling or the floor, governments or designated organizations will intervene in the market and affect the price. Price ceiling and floor is a risk management instrument that can effectively mitigate the risks of emissions trading for governments, participants and socio-economic development.

The following are three major factors that lead the allowance price too high or too low:

(1) Governments do not fully comprehend the emissions situation of the regions. The deviation between anticipation of future emission trend and actual situation is excessive, as well as the abatement cost. So the scheme cap is not reasonably set—a too high cap lead price too low; or a too low cap lead price too high;

(2) Some participants manipulate the market, exert excessive influence on price and speculate in the market;

(3) Unforeseen events such as economic crisis lead to drastic changes in supply and demand and extreme volatility in allowance price.

No matter for what reasons, volatile allowance price is unfavorable for reaching the emissions control target through emissions trading. It is necessary for ETS to send a clear, long term and stable price signal to covered enterprises. A too high allowance price would raise the production cost of enterprises, decrease their competitiveness, affect regional economic development, depress the willingness of enterprises to involve in the trading and may lead to “carbon leakage”. Excessively low allowance price would discourage enterprises to invest in low-carbon business, including improving energy efficient and investing in renewable energy etc. In the long run, excessively low carbon price will delay the emission reduction pressure and may lead to even higher abatement cost.

There are four functions of setting price ceiling and floor:

(1) Send a clear price signal to enterprises and consumers for decreasing their use of fossil energy and improving energy efficiency;

(2) Stimulate enterprises to conduct R&D in low carbon technology and adjust energy mix;

(3) Provide a foundation for a stable policy in a longer term to improve the accuracy and predictability of decisions made by enterprises;

(4) Stabilize market development. This function is quite apparent especially in the initial stage of emissions trading.

7.4.2 Study on approaches of price containment

When the allowance price reaches the ceiling or floor set by governments, the following three approaches can be adopted to control the price:

(1) Government intervention of the market directly through selling and buying.

Price ceiling or floor is set by governments. When the trading price exceeds the ceiling, the government shall provide more allowances in the market; when the trading price is lower than the floor, the government can maintain the stability of market price through repurchasing some allowances. Uncertainty of policy information, especially in scheme reduction targets, is the most disadvantageous part for this method. Provision and repurchase of allowance will affect the cap of total emission volume in ETS to some extent, however ensure the certainties in trading price.

(2) Ceiling price and reserve price in auction

This approach is applicable for auction-based initial allowance allocation, a primary market of allowance forms through regular auctions and the secondary market forms through trading of participants. When the primary and the secondary market are in similar size, price containment in the primary market can effectively control the price in the secondary market. Compared to direct intervention of governments, controlling price in the auction is much simpler with lower cost and minimum impact on the credibility of governments.

(3) Adjusting compliance requirements

Governments can adjust the cap of the proportion of offset credits in allowance surrendered by enterprises for compliance in order to adjust the trading price. When the trading price is too high, government can increase the proportion of offset credits in order to decrease the demand for allowance and trading price; when the price is too low, the government can decrease the proportion of offset credits in order to expand the demand of enterprises for allowance and increase the trading price. Price containment conducted through adjusting compliance requirements has no material influence on emission reduction targets. But the approach is less effective compared to direct intervention.

7.4.3 Study the rationality of price containment

Controlling price in allowance trading can ensure the certainty in price, but violate the certainty in scheme's emission targets, weaken the formation of pricing mechanism in the market and affect the credibility of policy to some extent. These are the main considerations of groups who are against the price containment.

But ETS is not a natural market but formulated based on policy. Its success relies on whether the targets set by the government are achieved, i.e. whether the emission is reduced in low cost. Therefore, both emission abatement cost and scheme targets have to consider comprehensively while designing the scheme. From this point, it is rational to control allowance price and allow it to fluctuate in a certain scale. The price containment mechanism is necessary especially in the initial stage of setting up the market without good operation experience when enterprises and consumers do not fully understand the cost of carbon.

Along with the development of the market, price ceiling and floor should be adjusted accordingly. With expansion of market coverage, the price containment mechanism should be less restrictive till it is eventually nullified.

7.4.4 Study on the patterns of setting allowance price ceiling and floor

Firstly, in theory, the trading price of allowance should be equal to the marginal abatement cost of covered enterprises. Even if issues related to trading cost and information asymmetry etc. do exist in actual trading, the ideal market price should fluctuate around the marginal abatement cost. The marginal abatement cost is thus considered while setting allowance price ceiling and floor. The marginal abatement cost can be evaluated through a "top-down" or "bottom-up" model.

Secondly, stipulating the mandatory emission reduction obligation for enterprises will increase their production cost. So the enterprises' acceptability of emission abatement cost should be considered. Meanwhile, the consideration by governments to balance

economic development and emissions control, i.e. the governments' acceptability of allowance price should also be considered.

Thirdly, from a global perspective, EU, Australia, New Zealand and some provinces or states of the United States and Canada have carried out ETS. As the largest carbon market with the longest operation history, the allowance price of EU ETS is very influential on global carbon market. As the ETS in other market expands, the influence of other markets will increase. The intention of setting a price cap is to eliminate the impact of excessive carbon cost on the competitiveness of enterprises. Therefore, price cap setting should take the similar provisions of carbon market in other regions as a reference.

Fourthly, considering the possible offset mechanism in China ETS, it is necessary to consider the price level of different types of offset credits, i.e. the emission abatement cost for non-mandatory market participants to reduce emission of greenhouse gas.

The set price floor of ETS should be lower than the anticipated marginal abatement cost and the price of credits. Setting price cap should consider the governments' and enterprises' acceptability of carbon price and take the conditions of other regional carbon markets as a reference. Moreover, the price ceiling and floor should not be fixed. It is more reasonable to adjust the price ceiling and floor along with process of emissions trading and on the basis on obtaining more emission cost information.

7.4.5 Propose a Plan of Implementing Price Containment Mechanism in China ETS

Analyze the specific conditions of building a nation-wide ETS in China from the above four perspectives, learn the experience of major ETS overseas and of the ETS pilot program in China; and propose if China ETS should adopt price containment mechanism and provide suggestions for the plan of solving specific issues regarding approaches of implementing price containment and implementation organization etc.

through theoretical analysis, on-site investigation, expert interview and symposiums participated by stakeholders.

7.5 Activities

(1) Study the implementation of the price containment mechanism in ETS at home and abroad;

a. Conduct theoretical research in price containment mechanism in emissions trading; analyze the influence of price containment on emissions control effect and economy and clear the methods of implementing the price containment mechanism;

b. Comprehend the conditions, lessons and experience of implementing the price containment mechanism in ETS overseas through documentation review and interview of experts;

c. Through documentation review and on-site investigation, acknowledge the price containment implemented in the areas involving in the ETS pilot program, designing of rules, experience and lessons etc.;

d. Study the specific conditions for China to carry out ETS trading and analyze the necessity of price containment mechanism;

e. Complete a Research Report on the Price Containment Mechanism in ETS.

(2) Propose a Plan of Implementing Price Containment Mechanism in China ETS

a. According to estimation of emission abatement cost of covered sectors and scale of influence of allowance price on economic development, analyze the reasonable price scale of allowances in China ETS;

b. Based on the study results above, propose a Preliminary Plan of Implementing a Price Containment Mechanism in China ETS;

- c. Invite experts to discuss the rationality and feasibility of implementing a price containment mechanism in China ETS and to offer suggestions;
- d. Complete the Plan of Implementing a Price Containment Mechanism in China ETS (proposed draft).

7.6 TOR

Objective(s) and Rationale

Objective(s)	Rationale
For keeping the price of China ETS at a stable level, analyze if it is necessary to implement a price containment mechanism in China ETS, study the feasibility and then propose a plan of implementing price containment mechanism in China ETS.	See the main text.

Deliverables

Deliverables	Description	Party Responsible for Ensuring Action
(1) Research Report on Price Containment Mechanism in ETS; (2) Plan of Implementing a Price Containment Mechanism in China ETS (proposed draft).	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
Research Report on Price Containment Mechanism in ETS	720	2 years
Plan of Implementing a Price Containment Mechanism in China ETS (proposed draft)	720	2 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total
(1) Study the implementation of the price containment mechanism in ETS at home and abroad; a. Conduct theoretical research in price containment mechanism in emissions trading; analyze the influence of price containment on emissions control effect and economy and clear the methods of implementing the price containment mechanism; b. Comprehend the conditions, lessons and experience of implementing the price containment mechanism in ETS overseas through documentation review and interview of experts; c. Through documentation review and on-site investigation, acknowledge the price containment implemented in the areas involving in the ETS pilot program, designing of rules, experience and lessons etc.; d. Study the specific conditions for China to carry					

out ETS trading and analyze the necessity of price containment mechanism; e. Complete a Research Report on the Price Containment Mechanism in ETS.					
(2) Propose a Plan of Implementing Price Containment Mechanism in China ETS a. According to estimation of emission abatement cost of covered sectors and scale of influence of allowance price on economic development, analyze the reasonable price scale of allowances in China ETS; b. Based on the study results above, propose a Preliminary Plan of Implementing a Price Containment Mechanism in China ETS; c. Invite experts to discuss the rationality and feasibility of implementing a price containment mechanism in China ETS and to offer suggestions; d. Complete the Plan of Implementing a Price Containment Mechanism in China ETS (proposed draft).					
TOTAL BUDGET		100,000	100,000		200,000

Sources of Funding	Total (USD)
National Government	0
PMR	200,000
Other (if applicable)	0
Grand Total	200,000

8. Offset Mechanism and Scheme Linking

8.1 Background

The offset mechanism allows entities covered by ETS to use certified emission reduction credits generated by entities outside the scheme via emission reduction activities to fulfill their compliance obligations. Credits trading generally refer to project-based carbon trading; and CERs produced by CDM projects are a typical type of offset credits. Since 2005, China has achieved great success in developing CDM projects and remained as a key player in the global CDM market. As of July 2nd, 2012, China has registered 2012 projects with UN CDM Executive Board, account for 48.87% of the total projects registered by host countries; the estimated annual CO₂ emission reduction will amount 390,263,834 tons, 63.73% of the total by host countries, making China the world's No.1 in sheer number of projects and annual reduction. China's success in CDM project implementation will provide rich experience to the successful implementation of the national carbon trading scheme. And how to combine similar offset mechanism with the future national carbon trading scheme poses a very practical challenge. On June 13th, 2012, Department of Climate Change under NDRC issued Provisional Measures for the Administration of Voluntary Greenhouse Gas Emission Reduction Transactions and referred recorded emission reduction as China Certified Emission Reduction (CCER), whose use shall be studied in future's national emissions trading system. Almost all existing ETSs allow the use of offset credits, but they all specify the sources, types and quantitative limits of credits in details.

Scheme linking means to incorporate emission allowances and reduction credits outside the system into it for the purpose of fulfilling the compliance obligation of the system. The linking mechanism is part of the rules governing emissions trading and can help to expand the coverage of emissions trading systems and address the "competitiveness issue" and "carbon leakage" caused due to different restraints of various carbon policies. Meanwhile, system linking can increase the amount of emission

allowances and mitigate the price fluctuation of carbon trading. As it concerns the coordination of different rules under different systems, the linking mechanism shall include following items: scheme target, methodology for the initial allocation of emission allowances, monitoring, reporting and verification mechanism, regulation on the use of offset credits, compliance mechanism, rules on banking and borrowing, price containment mechanism, trading registration system and technical specifications regarding the trading platform.

Many countries intend to link their emissions trading systems with external systems so as to expand the coverage of the carbon market and reduce the possibility of "carbon leakage". As China has a large amount of emissions, the scale of future national ETS will be huge, making it very meaningful to study the basic requirements for China to link its carbon market with others.

8.2 Objective

Propose the offset mechanism plan for China emissions trading scheme; stipulate the type, amount and source of offset credits allowed by China ETS for compliance; analyze the basic requirements for China to link its emissions trading market with others.

8.3 Deliverable(s)

(1) Report on the Design of the Offset Mechanism for China Emissions Trading Scheme (Proposal)

(2) Report on the Analysis of Basic Requirements for Linking China Emissions Trading Scheme with Other Systems.

8.4 Research Methodology

Research Methodologies for this part mainly include literature review, document study, interview and qualitative analysis. By studying documentations, we came to understand

the implementation of the offset mechanism for the carbon trading scheme from practical and theoretical perspective, and came up with initial regulations on the use of offset credits in the context of China's actual situation of emissions trading. And then, analyze the basic requirements for linking China's trading system with others. Some modeling analysis will also be conducted in this part.

8.4.1 The Offset Mechanism for China's Carbon Trading

The offset mechanism can reduce the compliance cost borne by entities covered by the carbon trading scheme. The offset credits could be generated by facilities not covered by the domestic system or produced by facilities in other regions, such as the credits generated by CDM projects under the Kyoto Protocol. As China has the largest number of registered CDM projects and the highest annual emission reduction, it garners rich experience in the development of CDM projects. In addition, Provisional Measures for the Administration of Voluntary Greenhouse Gas Emission Reduction Transactions provide regulations for the launching and development of voluntary emission reduction projects. When the national carbon trading system is set up in the future, many issues concerning CER, CCER and VER shall be deeply studied, including at least following issues:

- (1) Whether reduction credits can be used for fulfilling compliance obligations?
- (2) What types of reduction credits are allowed, such as CER, CCER, VER or others?
- (3) Reduction credits generated by projects from where are allowed, domestic or overseas?
- (4) What is the limit to the proportion of different types of credits to the compliance allowances submitted by covered entities?
- (5) Should credits and allowances be treated differently and whether they can be swapped?

(6) A scientific and rational accounting system should be developed to avoid double counting of emissions reductions.

When studying those issues, we should look at both overseas experience and China's reality, including the coverage of China's carbon trading scheme, abatement potential of covered sectors, abatement cost and difficulties, reduction cost of emission reduction projects and trading cost.

8.4.2 Analysis of Basic Requirements for Linking China ETS with Others

Emissions trading can decrease the emission abatement cost, while how much can be decreased depends on the difference of the abatement costs of various emission sources covered by the trading system. By linking different schemes, we can expand the coverage of the system and provide more low-cost approaches to emission reduction, and therefore, reduce the overall abatement cost of the society. Moreover, system linking can help to build a relatively unified emissions monitoring system, enabling big cross-regional companies to select more appropriate reduction strategies and reduce their operating cost, and to avoid the relocation of a company from a region with tightened carbon policies to a region with relaxed carbon policies (so called "competitiveness issue"), which will lead to the "carbon leakage". The quantity of allowances in a linked system will increase and the liquidity of allowance trading will increase accordingly so as to mitigate price fluctuations.

There're two ways to link different emissions trading systems: First is to link different systems directly, which means, emission allowances from different systems are recognized by each other and allowed to be traded freely; second is to adopt the offset mechanism to allow particular credits generated through reduction activities to enter the trading market. Credits can be produced only in the region where the system is functioning or from other systems or even overseas markets. At the same time, rules shall be set out for the swap between credits and allowances.

Linking emissions trading schemes, however, is not something easy as some specific rules governing various systems to be linked must be aligned, or at least, kept similar through negotiations. These rules should touch upon following points: scheme abatement target, initial allocation of allowances, monitoring, reporting and verification mechanism, regulation on the use of offset credits, compliance mechanism, rules on linking and borrowing, and price containment mechanism. These are basic requirements to be analyzed carefully for the study on linking China's carbon trading system with others.

8.4.2.1 Mutual Recognition of Abatement Targets

Linking will only be possible between the systems with similar levels of emission reduction targets. The strength of the ambition to reduce emissions of linked systems should be comparable and recognized by each other. It is to say the systems to be linked should have carbon constraints with similar strength. Any problem of mutual acceptability reduces the ambition inherent in the cap, and any procedures for adjusting the cap need to be acceptable to the linking partner. However, this comparability is not absolutely mandatory; as long as the emission targets of different schemes are recognized by each other, accepting the linkage, then the ETS linking can be implemented.

8.4.2.2 Initial Allocation Method of Emission Allowances

Initial allocation of emission allowances is associated with the distribution of benefits. This allocation has distribution effects, affecting different sectors and enterprises covered by the ETS in different ways. Schemes will adopt suitable allocation method according to the economic development and industrial structure of the local area. This means that different systems could take different support attitudes to sectors through initial allowance allocation, which will affect the competition between enterprises in the same sector of different areas. If systems link under this situation, the enterprises with redundant initial allowances will benefit from other systems through allowance

selling. This may lead to trade friction, causing the dissatisfaction of emissions trading and even affecting the regional economic development. Giving a most extreme example, we assume that all allowances would be auctioned in system A, while all allowances would be allocated for free in system B. If the two systems link together, the participants in system A will buy allowances from system B to lower the cost, resulting benefit flows from A to B. Therefore, scheme linking would be affected if there are definite differences in initial allocation rules between different schemes.

Different allocation rules have different distribution effects, the impacts of initial allocation before and after ETS linking should be analyzed in details before implementing ETS linking. However, it is apparent that the incompatibility of allocation methods will affect the political willingness for systems to link.

8.4.2.3 Mechanisms for Monitoring, Reporting and Verification (MRV)

The real-time and accuracy of emissions data are fundamental to ensure smooth process of emissions trading, which requires a comparatively perfect mechanism of monitoring, reporting and verification to guarantee. The linked schemes should firstly build trust for the data of each other; this requires them to coordinate on the MRV mechanism, including monitoring methods, the data content and specification of reporting, verification requirements, recognition of the qualified third-party verification agencies, etc.

Obvious differences in MRV requirements would cause issues like allowance quality and emission index swap during emissions trading between schemes. For example, if system A and B have different requirements on monitoring and verification; system A is strict in emission data monitoring and requires verification every quarter, while system B's emission data quality is worse and only requires annual verification; then the accuracy of allowance information of system B is worse than A, thus the trust and market acceptance of system B's allowances are lower than A. When several schemes are linked together, the price of A's allowances will be higher than B's. And there would

be allowance swap when trading happened between system A and B, it is to measure how many allowances in system B would be equivalent to one unit system A's allowance.

8.4.2.4 Provisions for Offset Credits

Besides direct linking, offset mechanism can also provide more low-cost abatement opportunities for ETS participants. Offset allows enterprises to buy emission reduction credits generated by specific abatement projects to cover their emissions. Different systems may take different attitudes towards the use of credits; however once systems are linked, any differences in treatment of credits disappear de facto and credits may enter the market through the national system with the most permissive rules, where they can be swapped into freely tradable allowances. Assume that system A allows the use of credits, while system B refuses the credits; and these emission reduction credits can be swapped into allowances of system A. After the linking of system A and B, the credits can then swapped into system B's allowances from system A's allowances, thus can be tradable freely in either system A or system B. The mechanism of offset in fact increases the overall cap of ETS, so the proportion of credits using in compliance needs to be limited. The use of credits would affect the market price of emissions trading, as well as the actual emission reduction amount of schemes.

Before ETS linking, schemes should coordinate on the mechanism of offset and provisions for credits using, including sources, types and limits of credits. The willingness for linking will be affected without this coordination. Assume that system B's requirements for credits using are more strict than system A, there will be large amount of credits generated outside enter system A, resulting its actual reduction amount lower than the previous target and its abatement cost is artificially reduced. Examination of the actual reduction amounts of system A and B as a whole in this situation will increase the pressure of system B. Moreover, credits can be firstly swapped into system A's allowances and then sold to system B. This "swapping and

selling” strategy may lead to profit flows from system B to A through low-quality credits trading, affecting the willingness of system B for linking.

8.4.2.5 Compliance Mechanisms

Compliance mechanism refers to the relevant rules assessing whether the ETS participants comply with their obligations and the punishment they will meet if they failed to comply. Firstly, from the view of abatement target achievement, the schemes with strict compliance mechanisms will be more likely to achieve the target than schemes with lenient rules. Assume that some schemes’ compliance mechanisms are lenient; they are very likely to realize their abatement target, thus lower the linking willingness of other schemes. Secondly, even if all the linked schemes can achieve their targets, the differences in compliance mechanisms may also lead the market price not really reflect the abatement costs. In the situation of two schemes linked, enterprises covered by the scheme with more strict compliance mechanism may buy more allowances from the other system, to avoid being punished when failing to complete the abatement obligation. However, this behavior may lead to less actual emission reduction actions, delaying the low-carbon transition, affecting the local environmental integrity and violating the original intention of linking, finally affecting the willingness of schemes to link. Therefore, the linked schemes need to coordinate their compliance mechanisms, making their compliance strength comparable.

8.4.2.6 Provisions for Banking and Borrowing

In general, banking and borrowing will make linking technically more difficult. As long as one scheme allows borrowing, the environmental integrity of the whole linked scheme will be affected, delaying actual emission reduction actions. For this reason, borrowing is not allowed in almost all operating and proposed schemes. Banking also causes some problems: in the situation of linking, participants of schemes that allow banking are able to purchase allowances or credits from other schemes and bank them for later use when the abatement cost is higher. This behavior will result these schemes’

actual reduction amount below their abatement potential, and is not conducive to the development and application of low-carbon technologies. This “purchase and bank” strategy will lead the schemes without banking mechanism to make large amount of emission reduction with high abatement cost, giving them more abatement pressure, and lowering their linking willingness. Therefore, schemes should coordinate in whether allowing banking and borrowing, as well as specific provisions for banking and borrowing, and reach a consensus. This will reduce the excessive speculative behaviors using these provisions, and also reduce the difficulties of linking caused by differences in provisions for banking and borrowing.

8.4.2.7 Price Containment Mechanism

Price containment mechanisms refer to the measures some schemes take to maintain the emissions trading stable, such as price ceilings, price floors and safety valves. These mechanisms are beneficial for the smooth development of emissions trading; however they will also affect scheme’s willingness for linking. If some systems take the measure of “safety valve”, the authorities of emissions trading would allocate more allowances when the allowance price exceeds a certain threshold. This will lead to the dissatisfaction of other systems, and lower their willingness for linking. Actually the safety valve decreases the systems’ abatement targets to ensure the ETS participants to reduce emissions with low cost. As long as there’s such a price ceiling, the participants will never choose allowances from other schemes whose prices are higher than the threshold, which leading to higher abatement costs in schemes without price containment mechanisms. Meanwhile, the production costs in schemes that take price containment measures may be lower than in other schemes, which would lead to trade friction and other issues. The price containment mechanisms artificially affect the differences of abatement costs between systems, are not conducive to the allowance liquidity in markets. More importantly, the mutual recognition of abatement targets is the basis of linking; but some price containment behaviors change the abatement targets

in fact. Therefore, the linked schemes should coordinate in price containment mechanisms and try to reach a consensus.

8.5 Activities

(1) Study the offset and linking mechanism of domestic and overseas emissions trading systems.

a. Analyze the theories for offset and linking mechanism of the emissions trading system via literature review and expert interview;

b. Study the offset and linking practices of foreign emissions trading systems through documentation research and expert interview, summarize factors and problems to be considered for designing the offset mechanism, and understand the reasons for why to link trading systems, what problems to be addressed and what effect to be achieved, as well as the design, implementation of the offset and linking mechanism, learn lessons and experience from others;

c. Study pilot projects of the emissions trading in China through documentation research and expert interview, understand the offset and linking status during project implementation and the design rules, and learn lessons and experience from them.

(2) Study China's actual situation regarding the offset and linking mechanism of ETS

a. Study the development difficulty, emission reduction cost, credit trading cost, emission reduction volume, and emission reduction cost accounting of China's project-level abatement activities;

b. Conduct a research over various departments, sectors and companies involving in China emissions trading scheme and understand their attitude towards the offset and linking mechanism.

(3) Propose a design plan of the offset mechanism for China emissions trading scheme

- a. Study to propose initial suggestions on the design of the offset mechanism for China emissions trading scheme;
- b. Invite experts to discuss the rationality and feasibility of implementing the offset mechanism for China emissions trading scheme and ask them to give opinions and suggestions on the initial plan of the mechanism;
- c. Complete the Proposed Draft of Design Report on the Offset Mechanism of China emissions trading scheme.

(4) Study the basic requirements for linking China emissions trading scheme with others

- a. Study to propose the basic requirements for linking China emissions trading scheme with others;
- b. Invite experts to discuss basic requirements for linking China emissions trading scheme with others and ask them to give opinions and suggestions on the analysis report;
- c. Complete the Analysis Report on the Basic Requirements for Linking China ETS with Others.

8.6 TOR

Objective(s) and Rationale

Objective	Rationale
Propose the offset mechanism plan for China emissions trading scheme; stipulate the type, amount and source of offset credits allowed by China’s ETS for compliance; analyze the basic requirements for China to link its emissions trading market with others.	Set the main text

Deliverable(s)

Deliverable(s)	Description	Party Responsible for Ensuring Action
(1) Recommendation Draft of Design Report on the Offset Mechanism of China emissions trading scheme (2) Analysis Report on the Basic Requirements for Linking China emissions trading scheme with Others	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
Recommendation Draft of Design Report on the Offset Mechanism of China emissions trading scheme	720	2 years
Analysis Report on the Basic Requirements for Linking China emissions trading scheme with Others	720	2 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year2	Year 3	...	Total

<p>(1) Study the offset and linking mechanism of domestic and overseas emissions trading systems.</p> <p>a. Analyze the theories for offset and linking mechanism of the emissions trading system via literature review and expert interview;</p> <p>b. Study the offset and linking practices of foreign emissions trading systems through documentation research and expert interview, summarize factors and problems to be considered for designing the offset mechanism, and understand the reasons for why to link trading systems, what problems to be addressed and what effect to be achieved, as well as the design, implementation of the offset and linking mechanism, learn lessons and experience from others;</p> <p>c. Study pilot projects of the emissions trading in China through documentation research and expert interview, understand the offset and linking status during project implementation and the design rules, and learn lessons and experience from them.</p>					
<p>(2) Study China's actual situation regarding the offset and linking mechanism of ETS</p> <p>a. Study the development difficulty, emission reduction cost, credit trading cost, emission reduction volume, and emission reduction cost accounting of China's project-level abatement activities;</p> <p>b. Conduct a research over various departments, sectors and companies involving in China emissions trading scheme and understand their attitude towards the offset and linking mechanism.</p>					
<p>(3) Propose a design plan of the offset mechanism for China emissions trading scheme</p> <p>a. Study to propose initial suggestions on the design of the offset mechanism for China emissions trading scheme;</p> <p>b. Invite experts to discuss the rationality and feasibility of implementing the offset mechanism for China emissions trading scheme and ask them to give opinions and suggestions on the initial plan of the mechanism;</p> <p>c. Complete the Proposed Draft of Design Report on the Offset Mechanism of China emissions trading scheme.</p>					
<p>(4) Study the basic requirements for linking China emissions trading scheme with others</p> <p>a. Study to propose the basic requirements for linking China emissions trading scheme</p>					

with others; b. Invite experts to discuss basic requirements for linking China emissions trading scheme with others and ask them to give opinions and suggestions on the analysis report; c. Complete the Analysis Report on the Basic Requirements for Linking China emissions trading scheme with Others.					
Total		100,000	100,000		200,000

Sources of Funding	Total (USD)
National Government	0
PMR	200,000
Other (if applicable)	0
Grand Total	200,000

9. Market Oversight

9.1 Background

Generally speaking, market oversight has two aspects: oversight on market player access and oversight on market behaviors. In an emissions trading system, market oversight means that regulators use legal, economic and administrative approaches to oversee and manage initial allocation of emission allowance, the use of right, allowances trading, and other issues related with the emissions trading. It concerns the setting-up and authorization of regulators, the establishment and implement of oversight rules and might involve many departments like those responsible for initial allowance allocation, trading oversight and implementation of the compliance mechanism. Oversight on the market player access will be studied in Section 10 of Building Block 4, and market oversight in this part specially refers to oversight on market behaviors, or the oversight mechanism for the emissions trading behaviors.

The carbon trading market is a new-type market and it's necessary to build a complete oversight mechanism to oversee it effectively. First, the carbon market is an emerging

market. The trading of carbon, a special commodity, is very special in many areas, traditional trading rules and oversight mechanism may not accommodate requirements for carbon market oversight. Due to high risks inherent in the carbon market and an immature legal system, there're a lot of speculative activities in the market. European and other countries have witnessed some abnormalities in their carbon trading market, such as allowances were stolen and trading system was destroyed. Second, the carbon trading market needs very professional knowledge and has asymmetry information regarding the production, release, marketing, sales of carbon products and policy changes. In fact, information asymmetry exists in every level and tache of the carbon market. Third, the carbon trading market is also a credit market. Validity of carbon credits production and trading all lie on strict and fair oversight in all taches. Various oversight policies in the carbon trading market, concerning such as emission monitoring, information disclosure, index tracking, and incompliance responsibility have a direct impact on the development of the market. Forth, the carbon trading market has many attributes, diversified participants, numerous trading procedures, and various carbon products and is technical oriented. Participants of the carbon trading include companies, financial institutions, technical service agencies and NGOs. The carbon trading includes OTC trading and floor trading while this floor market has features of the financial market, energy market and property market at the same time. Those market behaviors should be under the oversight in any society. In a summary, oversight on the carbon market is more than necessary for maintaining the market order, preventing insider trading, market manipulation, dissemination of false market information and so on.

Therefore, all countries have designed their market oversight system for their respective emissions trading systems accordingly. Let's take EU as an example, the expansion of EU ETS market is accompanied by many problems, such as market abuse and price manipulation. In particular, a series of allowance frauds and thefts make it more imperative to strengthen market oversight. As a result, European Commission

issued an enhanced market oversight framework for the EU Emissions Trading Scheme and specified the categories and core functions of institutions which are responsible for market oversight in 2010. The European Commission released Market Abuses Directive (MAD), Transparency Directive (TD) and Markets in Financial Instruments Directive II (MiFID II) in the end of 2011, which prescribed that spot trading of emission allowances under EU ETS should be brought into the financial instruments oversight system. When it comes to trading behaviors in the carbon market, EU has several requirements as follows: (1) The high standard of integrity applies to all market participants, dissemination of false information or manipulation of rumors is strictly prohibited; (2) Under EU ETS, companies with large-sized emission facilities are not allowed to gain profits from internal information to jeopardize other market participants; (3) A more transparent and simpler access to information (such as trading volume and price) shall be provided to all market participants; (4) Safeguard against the money laundering shall be carried out in all areas of the carbon market, which means that spot trading of allowances in the future will be classified as financial instrument for unified oversight just like the trading of allowance futures, equities and other derivatives. Meanwhile, allowances will be allocated mainly through auctions in the third stage of EU ETS, and European Commission has developed oversight rules over the auction market. In a word, as one of the successful carbon markets, EU's carbon market can attribute its good functioning to the continuous improving market oversight system that draws experience from financial regulation method. Besides EU, Australian Clean Energy Regulator is also charged with implementation of market oversight, while Australian ETS will be formally launched in July 2015 and combined with EU ETS. The Clean Energy Regulator is an independent statutory authority established by the Clean Energy Regulator Act 2011 announced by the Parliament of the Commonwealth of Australia. One of its responsibilities is monitoring, facilitating and enforcing compliance with the carbon pricing mechanism, and another is working with other national law enforcement and regulatory bodies to enhance market oversight, like the

Australian Securities and Investments Commission, the Australian Competition and Consumer Commission and the Australian Federal Police.

To define the scope, authorities and rules of oversight on China's carbon trading behaviors, we must consider different development stages of the carbon trading market, strike a balance between existing and future systems, coordinate local and central regulators and weigh market behaviors against government interference. Although China has some market oversight rules over emissions trading, for instance, The Implementation Opinions of the General Office of the State Council on Rectifying Various Types of Trading Venues clearly stipulates that emissions shall be traded using a standardized contract and centralized trading using a standardized contract is prohibited. However, more outstanding problems are to be addressed. (1) There're international disputes over the legal attributes of emissions, therefore how China implements the market oversight will partly depend on the China's definition of legal attributes of emissions. (2) In the initial, transitional and mature stages of the emissions trading, emissions are expected to be traded as spots, a mix of spots and futures and futures respectively. As China has different management regimes for the trading of spots and futures, it's necessary to build a market oversight system in accordance with the trading system. (3) Different regions may have different levels and different foundations of understanding works related with emissions trading, and it's important to clarify whether different regions are subject to the same regulators or rules.(4) China does not have a fully market-based trading system, it is necessary to specify that which government department should interfere with improper trading behaviors under specific circumstance.(5) As China's existing financial market is not mature and has many problems, it's imperative to prevent major incidents or accidents to ensure successful implementation of the emissions trading scheme.

In a summary, based on existing practice and experience, the emissions trading scheme is cross-regional, highly complex and multi-layered, reasonable and effective market oversight can help oversee market behaviors, maintain market stability, protect legal

rights and interests of companies, and promote fair, sound and orderly market development. In order to ensure the smooth implementation of emissions trading in China, we should put in place a comprehensive and coordinated market oversight system considering China's reality.

9.2 Objective(s)

Identify important issues relevant with the emissions trading scheme oversight, draw experience and lessons from foreign emissions trading practice, domestic pilot projects and other relevant markets, propose a market oversight plan on China emissions trading scheme that include content, authorities, targets and rules of the oversight.

9.3 Deliverable(s)

- (1) Research report on market oversight of emissions trading mainly includes:
 - a. Study on foreign market oversight of emissions trading;
 - b. Study on market oversight on domestic pilot projects and in related markets
 - c. The Market Oversight Plan on China Emissions Trading Scheme (Recommendation Draft)

9.4 Research Methodology

(1) Study foreign market oversight approaches of emissions trading systems via documentation research, such as EU ETS, American GHG trading program, the New Zealand emissions trading scheme, California's cap-and-trade program, and Australia's carbon pricing mechanism. Summarize and analyze content, authorities, targets and rules of oversight related with emissions trading markets and other important issues.

(2) Study domestic oversight of relevant market behaviors through documentation research and expert interview; analyze and summarize prevailing problems in China's market oversight, such as oversight of the power market and of the futures and

securities market.

(3) Learn from experience of local emissions trading pilot projects through on-site research and expert interview to find out regional or individual problems to be resolved for China to impose oversight of the emissions trading scheme.

(4) Identify and summarize core problems and key factors in China emissions trading scheme oversight, propose a market oversight plan on China emissions trading system that includes content, authorities, targets and rules of oversight.

9.5 Research Activities

(1) Study foreign market oversight approaches of emissions trading systems and identify important issues relevant with the emissions trading market oversight.

a. Study foreign market oversight of emissions trading systems, such as EU ETS, American GHG trading program, the New Zealand emissions trading scheme, California's cap-and-trade program, and Australia's carbon pricing mechanism.

b. Summarize and analyze legal foundation, content, authorities, targets and rules of oversight related with emissions trading markets and other important issues.

c. Complete the research report on foreign market oversight of emissions trading.

(2) Study local emissions trading pilot project and oversight of relevant market to analyze and summarize challenges and experience for China to impose market oversight.

a. Study domestic oversight of relevant market behaviors, such as oversight of the power market and of the futures and securities market;

b. Analyze and summarize prevailing problems in China's market oversight;

c. Study local emissions trading pilot project via on-site visits.

d. Organize experts to discuss regional or individual problems to be resolved for China

to impose oversight of the emissions trading scheme;

e. Analyze and summarize challenges and experience for China to impose market oversight;

f. Complete a research report on market oversight of local pilot projects and relevant markets.

(3) Propose a market oversight plan on China emissions trading scheme

a. Identify and summarize core problems and key factors in China emissions trading scheme oversight;

b. Study possible market oversight approaches for different stages of China emissions trading scheme;

c. Through documentation review and expert interview, point out relative financial regulation to carbon market and trading;

d. Solicit opinions and suggestions from managing authorities, enterprises, third-party institutions and experts;

e. Propose an initial market oversight plan on China emissions trading scheme;

f. Invite experts to discuss the initial plan, and adjust and improve the plan based on opinions and suggestions given by experts;

g. Complete Market Oversight Plan on China Emissions trading Scheme (Recommendation Draft).

9.6 TOR

Objective(s) and Rationale

Objective	Rationale
Identify important issues relevant with the	See the main text

emissions trading market oversight, draw experience and lessons from foreign emissions trading practice, domestic pilot projects and other relevant markets, propose a market oversight plan on China emissions trading scheme that includes content, authorities, targets and rules of oversight	
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Deliverable(s)

Deliverable(s)	Description	Party Responsible for Ensuring Action
(1) A research report on market oversight of emissions trading (2) Market Oversight Plan on China Emissions trading scheme (Recommendation Draft)	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
A research report on market oversight of emissions trading	720	2 years
Scheme Oversight Plan on China Emissions Trading Scheme (Recommendation Draft)	720	2 years

Budget

Activity	Estimated cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total

<p>(1) Study foreign market oversight approaches of emissions trading systems and identify important issues relevant with the emissions trading market oversight.</p> <p>a. Study foreign market oversight of emissions trading systems, such as EU ETS, American GHG trading program, the New Zealand emissions trading scheme, California’s cap-and-trade program, and Australia’s carbon pricing mechanism.</p> <p>b. Summarize and analyze legal foundation, content, authorities, targets and rules of oversight related with emissions trading markets and other important issues.</p> <p>c. Complete the research report on foreign market oversight of emissions trading.</p>					
<p>(2) Study local emissions trading pilot project and oversight of relevant market to analyze and summarize challenges and experience for China to impose market oversight.</p> <p>a. Study domestic oversight of relevant market behaviors, such as oversight of the power market and of the futures and securities market;</p> <p>b. Analyze and summarize prevailing problems in China’s market oversight;</p> <p>c. Study local emissions trading pilot project via on-site visits.</p> <p>d. Organize experts to discuss regional or individual problems to be resolved for China to impose oversight of the emissions trading scheme;</p> <p>e. Analyze and summarize challenges and experience for China to impose market oversight;</p> <p>f. Complete a research report on market oversight of local pilot projects and relevant markets.</p>					
<p>(3) Propose a market oversight plan on China emissions trading scheme</p> <p>a. Identify and summarize core problems and key factors in China emissions trading scheme oversight;</p> <p>b. Study possible market oversight approaches for different stages of China emissions trading scheme;</p> <p>c. Through documentation review and expert interview, point out relative financial regulation to carbon market and trading;</p> <p>d. Solicit opinions and suggestions from managing authorities, enterprises, third-party institutions and experts;</p> <p>e. Propose an initial market oversight plan on China emissions trading scheme;</p> <p>f. Invite experts to discuss the initial plan, and adjust and improve the plan based on opinions and suggestions given by experts;</p> <p>g. Complete Market Oversight Plan on China Emissions Trading Scheme (Recommendation Draft).</p>					
Total		100,000	100,000		200,000

Sources of Funding	Total (USD)
National Government	Not counted here. Please refer to Building Block 8 Total Budget for further information.
PMR	200,000
Other (if applicable)	0
Grand Total	200,000

10. Participants and Trading Products

10.1 Background and Necessity

Just like the traditional commodity trading market, the emissions trading market has many participants including suppliers and buyers, intermediate merchant, financial institutions that provide funding and risk control, consulting agencies that provide technical service, etc. Suppliers and buyers are the major driving forces behind the market, but product trading relies on not only circulation of goods between suppliers and buyers, but also on intermediary service provided by a lot of intermediate merchant who make profits from commissions or spreads. Technical professionalism and complexity inherent in the emissions trading provide a living space to professional consulting agencies.

Among all participants in the emissions trading market, the most attention-grabbing and complex entities are financial institutions that make financial innovations in trading products. Investment banks, commercial banks, insurance companies and other financial institutions can engage in the trading directly, serve as providers of funding or technical consultations, or act as trading intermediaries to increase market liquidities. By providing funding or technical consultations, financial institutions cultivate the market and ensure its long-term development. Based on the trading of emissions allowances and certified emission reductions (offset credits), they also make financial innovations by developing futures, equities and other derivatives which will further develop and energize the emissions trading market, and provide flexible operational

solutions and a big space for market participants to satisfy their diversifying requirements. Despite all positive effects brought by financial institutions, potential risks caused by financial innovations shall not be underestimated and be treated prudently as they will increase market risks and uncertainties.

The participation and functioning of financial institutions in emissions trading markets can help China develop appropriately strict trading rules and oversight system in the context of China's reality, including rules governing the participation steps and paces of financial institutions and the positioning and regulation of financial derivatives. They will sustain market dynamics while keeping risks under control so as contribute to the sustainable, sound and stable development of the domestic emissions trading market.

In addition, exchanges are also important players in emissions trading markets. Major emission exchanges in Europe include European Climate Exchange, NordPool, etc. By providing trading platforms and standard trading models, exchanges gather various participants including sellers, buyers, hedgers and speculators in an orderly manner and provide them with corresponding trading service. Nowadays, domestic emission exchanges are chaotic, by studying the functions and roles of exchanges in the market, their service models and scopes as well as relevant technical platforms; we can better position and oversee emissions exchanges in the future, and give policy recommendations to the government, meanwhile, study of the business models and service of emission exchanges can provide some reference for the positioning of domestic exchanges and the development of business strategies.

10.2 objectives

Understanding participants of emissions trading markets, and the constitution, functions and evolvement of trading products, the key is to specify major approaches for financial institutions to participate in the emissions trading scheme, their trading products, function positioning and potential risks so as to provide technical support to developing market rules and the oversight system. It's particularly important to come

up with policy recommendations on how domestic financial institutions join the trading system and how to position the functions of carbon financial derivatives and their oversight system. To clarify how the national emissions trading market defines functions of exchanges and imposes oversight on them and give policy recommendations accordingly to the government.

10.3 Deliverable(s)

- (1) Research report on participants and trading products of the emissions trading scheme;
- (2) Policy Recommendation on Treatment of Participants and Trading Products of China Emissions Trading Scheme (Draft).

10.4 Research Methodology and Major Activities

10.4.1 Research Methodology

By studying participants and trading types in foreign emissions trading markets such as those in EU, Australia, New Zealand, California, we could understand the development of various types of participants and trading products in emissions trading markets, specify the kinds, roles of market participants and their importance to emissions trading markets. On such a basis, we shall further study how the financial institutions participate in the emissions trading market, the types, functions and risks of carbon financial derivatives, and draw lessons and experience from foreign carbon financial markets. By studying the participation and roles of foreign financial institutions in emissions trading markets, trading and risks of relevant derivatives, oversight rules and experience and lessons while keeping in mind the domestic financial market and the policy environment, and further based on an assessment of relative practices of China domestic pilot emissions trading systems, we shall give policy recommendations regarding the function positioning of domestic financial institutions in the domestic emissions trading market, participation steps and approaches as well as whether and

how China shall develop carbon financial derivatives.

At the same time, we need to first clarify functions, roles of foreign emissions trading exchanges, their service models and scopes as well as relative technical platforms, and to further take into consideration the development of domestic emission exchanges and outstanding problems, so that we could know how to position the functions of and oversee emission exchanges in China's emissions trading market in the future and provide policy suggestions to the government.

10.4.2 Major Activities

(1) Study various participants and trading products in emissions trading markets.

a. Documentation research: understand the types, constitution, functions and development of participants and trading products in foreign trading markets such as those in EU, Australia, New Zealand and California;

b. Expert interview: study basic information via documentation research and communicate with competent experts on the functions and roles of various participants and trading products;

c. Complete the research report on the basic information of various participants and trading products in emissions trading markets.

(2) Understand how foreign financial institutions participate in emissions trading markets

a. Documentation research: thoroughly understand basic information such as how financial institutions in EU, Australia, New Zealand and California play a role or participate in their emissions trading markets, trading and risks of relevant derivatives, oversight rules and experience and lessons;

b. Expert interview: communicate with competent experts on key issues such participation, function positioning and risk control of foreign financial institutions to

accurately understand how financial institutions and carbon finance promote the development of emissions trading markets and how to prevent potential risks associated with them;

c. Seminar organization: based on results attained through Activity a and b, further solicit suggestion and feedbacks from experts on trading market participation practice and experience of foreign financial institutions;

(3) Study the policy foundation for China to develop the carbon financial market

a. Documentation research: study the domestic financial market and the policy environment; develop a basic understanding on the function positioning of domestic financial institutions in the domestic emissions trading market, feasibility of their participation steps and approaches, whether and how China shall develop financial derivatives, relevant market risks and policy hurdles.

b. Expert interview: solicit opinions and feedbacks from competent experts on the participation of domestic financial institutions in the emissions trading market, the positioning and oversight of carbon financial derivatives, potential risks for China to develop the carbon finance and existing policy hurdles;

c. Seminar organization: hold seminars to discuss whether China is capable of developing the carbon financial market;

d. Based on Activity a, b and c, fairly and comprehensively evaluate the policy and legal foundation for China to develop carbon financial business.

(4) Study how Chinese financial institutions could participate in the emissions trading market, the positioning and oversight of financial derivatives

a. Summarization: based on Activity (1), summarize the legal policies and market foundation for developing the carbon financial market, the major models, content, functions and market risks of carbon financial business, conditions for developing relevant business and risk control measures;

b. Comparison and analysis: analyze infrastructure difference between China and other countries in developing the carbon finance and whether China has the infrastructure to develop carbon finance business and what kinds of business to be developed;

c. Expert discussion: solicit opinions from competent experts on whether and how China shall develop the carbon finance.

(5) Define the function positioning of domestic emission exchanges in China's emissions trading market

a. Documentation research: study the functions and roles of foreign emission exchanges in their respective markets, their service models and scopes as well as relative technical platforms; understand the function positioning and management of emission exchanges.

b. On-site investigation: visit domestic emission exchanges to have a deep understanding of businesses offered by those pilot projects, particularly roles of various exchanges and outstanding problems in their respective emissions trading markets;

c. Seminar organization: based on activity a and b, gather competent experts together and solicit their feedbacks and suggestions on the function positioning of exchanges in the future domestic emissions trading market and their development.

d. Define the function positioning of domestic exchanges in a nationally unified emissions trading market.

(6) Propose guiding opinions on participants and trading products of China's emissions trading market

According to results achieved in above-mentioned activities, complete Guiding Opinions on Participants and Trading Products of China Emissions Trading Scheme (Recommendation Draft)

10.5 TOR

Objective(s) and Rationale

Objective	Rationale
Understanding participants of emissions trading markets, and the constitution, functions and involvement of trading products, the key is to specify major approaches for financial institutions to participate in the emissions trading scheme, their trading products, function positioning and potential risks so as to provide technical support to developing market rules and the oversight system. It's particularly important to come up with policy recommendations on how domestic financial institutions join the trading system and how to position the functions of carbon financial derivatives and their oversight system. To clarify how the national emissions trading market defines functions of exchanges and imposes oversight on them and give policy recommendations accordingly to the government.	See the main text.

Deliverable(s)

Deliverable(s)	Description	Party Responsible for Ensuring Action
(1) Research report on participants and trading products of the emissions trading scheme; (2) Policy Recommendation on Treatment of Participants and Trading Products of China's Emissions Trading Market (Draft).	See the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
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Research report on participants and trading products in emissions trading markets	720	2 years
Guiding Opinions on Participants and Trading Products of China Emissions Trading Scheme (Recommendation Draft)	720	2 years

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	...	Total
<p>(1) Study various participants and trading products in emissions trading markets.</p> <p>a. Documentation research: understand the types, constitution, functions and development of participants and trading products in foreign trading markets such as those in EU, Australia, New Zealand and California;</p> <p>b. Expert interview: study basic information via documentation research and communicate with competent experts on the functions and roles of various participants and trading products;</p> <p>c. Complete the research report on the basic information of various participants and trading products in emissions trading markets.</p>					
<p>(2) Understand how foreign financial institutions participate in emissions trading markets</p> <p>a. Documentation research: thoroughly understand basic information such as how financial institutions in EU, Australia, New Zealand and California play a role or participate in their emissions trading markets, trading and risks of relevant derivatives, oversight rules and experience and lessons;</p> <p>b. Expert interview: communicate with competent experts on key issues such participation, function positioning and risk control of foreign financial institutions to accurately understand how financial institutions and carbon finance promote the</p>					

<p>development of emissions trading markets and how to prevent potential risks associated with them;</p> <p>c. Seminar organization: Based on results attained through Activity a and b, further solicit suggestion and feedbacks from experts on trading market participation practice and experience of foreign financial institutions;</p>					
<p>(3) Study the policy foundation for China to develop the carbon financial market</p> <p>a. Documentation research: study the domestic financial market and the policy environment; develop a basic understanding on the function positioning of domestic financial institutions in the domestic emissions trading market, feasibility of their participation steps and approaches, whether and how China shall develop financial derivatives, relevant market risks and policy hurdles.</p> <p>b. Expert interview: Solicit opinions and feedbacks from competent experts on the participation of domestic financial institutions in the emissions trading market, the positioning and oversight of carbon financial derivatives, potential risks for China to develop the carbon finance and existing policy hurdles;</p> <p>c. Seminar organization: hold seminars to discuss whether China is capable of developing the carbon financial market;</p> <p>d. Based on Activity a, b and c, fairly and comprehensively evaluate the policy and legal foundation for China to develop carbon financial business.</p>					
<p>(4) Study how Chinese financial institutions could participate in the emissions trading market, the positioning and oversight of financial derivatives</p> <p>a. Summarization: Based on Activity (1), summarize the legal policies and market foundation for developing the carbon financial market, the major models, content, functions and market risks of carbon financial business, conditions for developing relevant business and risk control measures;</p> <p>b. Comparison and analysis: analyze infrastructure difference between China and other countries in</p>					

<p>developing the carbon finance and whether China has the infrastructure to develop carbon finance business and what kinds of business to be developed;</p> <p>c. Expert discussion: solicit opinions from competent experts on whether and how China shall develop the carbon finance.</p>					
<p>(5) Define the function positioning of domestic emission exchanges in China's emissions trading market</p> <p>a. Documentation research: study the functions and roles of foreign emission exchanges in their respective markets, their service models and scopes as well as relative technical platforms, understand the function positioning and management of emission exchanges.</p> <p>b. On-site investigation: visit domestic emission exchanges to have a deep understanding of businesses offered by those pilot projects, particularly roles of various exchanges and outstanding problems in their respective emissions trading markets;</p> <p>c. Seminar organization: Based on Activity a and b, gather competent experts together and solicit their feedbacks and suggestions on the function positioning of exchanges in the future domestic emissions trading market and their development.</p> <p>d. Define the function positioning of domestic exchanges in a nationally unified emissions trading market.</p>					
<p>(6) Propose guiding opinions on participants and trading products of China's emissions trading market</p> <p>According to results achieved in above-mentioned activities, complete Guiding Opinions on Participants and Trading Products of China's Emissions trading Market (Recommendation Draft)</p>					
Total	100,000	100,000			200,000

Sources of Funding	Total (USD)
National Government	Not counted here. Please refer to the Building Block 8 Total budget for further information.
PMR	200,000
Other (if applicable)	0
Grand Total	200,000

Building Block 5: Key Study on the Participation of Central Government Managed State-owned Enterprises (SOEs) in China ETS

1. Overview of SOEs

1.1 General Situation

At present, there are 117 large-scale state-owned enterprises (hereinafter referred to as SOEs or Central Government managed State-owned Enterprises) in China, which are managed by the central government or its institutions, such as State-owned Assets Supervision and Administration Commission of the State Council (SASAC), China Banking Regulatory Commission (CBRC), China Insurance Regulatory Commission (CIRC) and China Securities Regulatory Commission (CSRC), etc.¹.

SOEs are engaged in all key sectors and services, such as power generation, oil exploration, petroleum processing, iron and steel, building materials, machine manufacturing, aviation and finance, etc.¹ In the following sections, the general situation of SOEs, including their quantity, regional distribution, sector distribution and operation are introduced and analyzed.

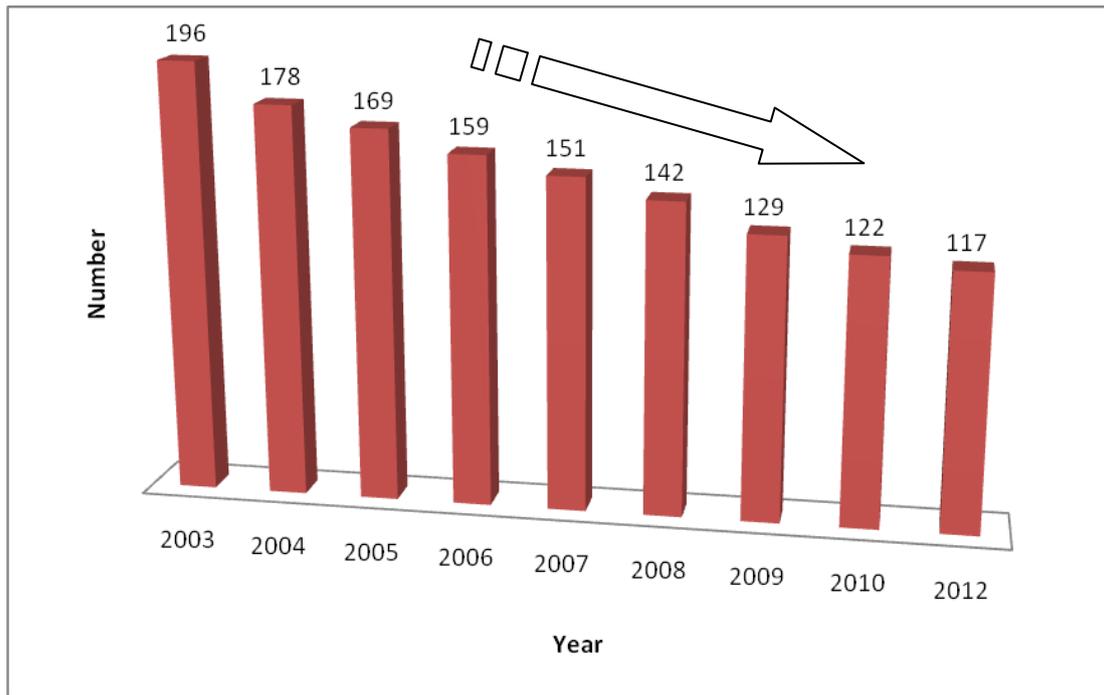


Figure 1. The change of the total numbers of SOEs in China from 2003 to 2012

Source: (1) WANG Bao-lin. *Report on Industry Development of Central Government Managed State-owned Enterprises*. China Economic Publishing House, Beijing, **2011**; (2) <http://www.sasac.gov.cn>.

Figure 1 shows the change of the total number of SOEs in China from 2003 to 2012. As can be seen from above, the total number of SOEs has been declining during this period. There were about 196 SOEs in 2003, and the number of SOEs declined to 122 by the end of 2010. It is reported that there were 117 SOEs in 2012.¹ The decline of the total number of SOEs is mainly due to the property right reform and the reorganization.

SOEs locate widely across China, but their regional distribution is uneven. Generally speaking, SOEs are mainly located in Beijing, Shanghai, Shandong, Liaoning, Heilongjiang, Hubei, Hunan, Guangdong, Henan, Jiangsu, Tianjin, Hebei, Anhui, Zhejiang, Shaanxi, Shanxi and Inner Mongolia. In addition, the regional distribution of SOEs varies with social and economic development.

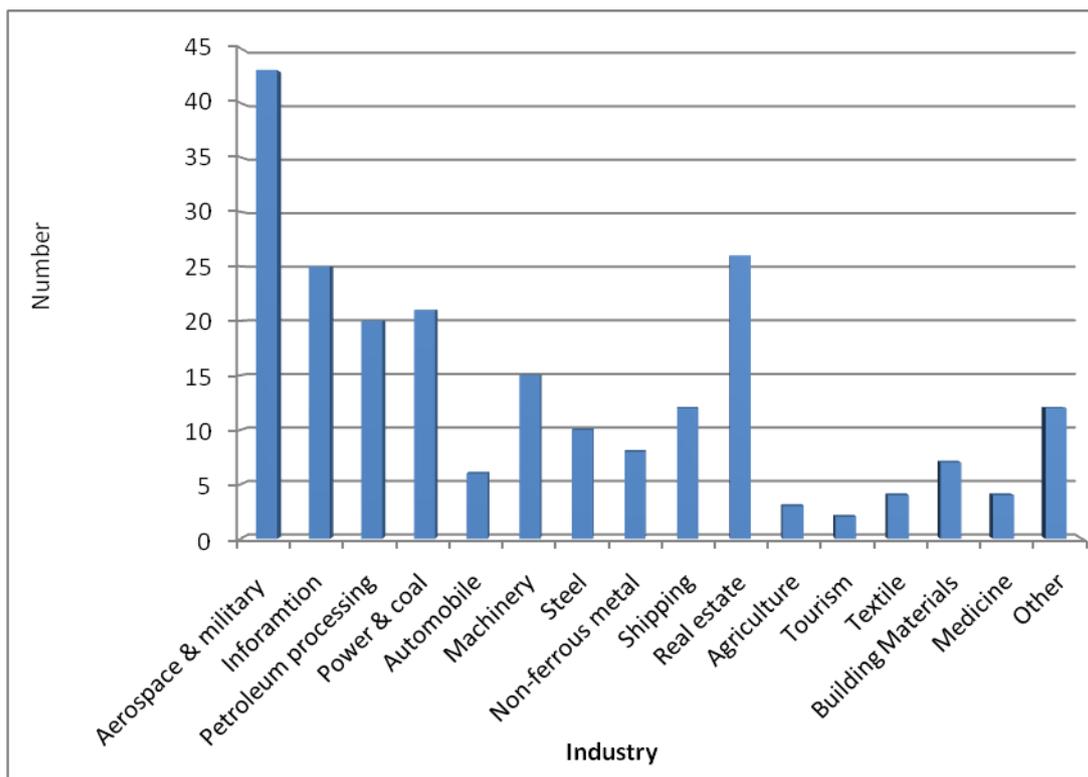


Figure 2. The industrial distribution of SOEs holding enterprises in 2010

Source: (1) WANG Bao-lin. *Report on Industry Development of Central Government managed State-owned Enterprises*. China Economic Publishing House, Beijing, **2011**; (2) <http://www.sasac.gov.cn>.

SOEs are the pillars of the national economy and powerful impetus for economic growth in China. Figure 2 shows the sectoral distribution of SOEs holding enterprises in 2010 from incomplete statistics. SOEs cover the production and operation of national strategic sectors, such as power generation, petroleum processing, energy production, iron and steel, machine manufacturing, building and building materials, aviation and finance, etc. It is reported that the added valued by SOEs was about 30% of China’s GDP in 2010, and the growth rate of added value created by SOEs was higher than that of China’s GDP.³ Most of the SOEs have made remarkable profits and their assets increase constantly. The gross state-owned asset of SOEs reached 24427.46 billion CNY in 2010 and was 16% higher than that in 2009. The net profit of SOEs was 852.27

billion CNY in 2010, which was 42.8% higher than that in 2009.^{6, 7, 8, 9}

1.2 Emission Reduction Actions

SOEs are the major sources of greenhouse gas (GHG) emissions in China, because most of SOEs are engaged in the production of cement, iron and steel, power generation, manufacturing and building, and petroleum chemicals, etc. These sectors have high energy-consumption intensity and produce a large amount of GHG emissions and pollutants. According to International Energy Agency (IEA), 50% of CO₂ emissions come from power generation sector in China, and 31.2% of CO₂ emissions are from manufacturing and building sector.¹⁰

In this regard, SOEs have made great effort to reduce their GHG emissions. During the 11th Five-Year Plan (11th FYP, 2006-2010) Period, SOEs adopted a series of powerful measures to reduce GHG emissions, including establishing mechanisms and technology platforms to conserve energy and reduce emissions. It is reported that SOEs have invested 348.6 billion CNY during the period of the 11th FYP in energy conservation, emission reduction, energy structure adjustment and energy efficiency improvement, etc.¹¹

SOEs have made significant achievements in emission reductions. SOEs' comprehensive energy consumption per 10,000 CNY (comparable price) in 2010 was 20.3% lower than that in 2005. It is estimated that SOEs conserved 175 million tce from 2006 to 2010. Figure 3 shows the ratio of the SOEs' energy-saving volume to the gross saving energy quantity of China in the period of the 11th FYP (2006-2010). From Figure

⁶ <http://www.sasac.gov.cn/n1180/n1566/n258203/n259490/13878095.html>

⁷ Bai Tian-Lian. *Encouraging Outcomes of the central enterprises*. The People's Daily, 2011-10-24.

⁸ <http://www.sasac.gov.cn/>

⁹ <http://finance.qq.com/a/20111017/002574.htm>

¹⁰ <http://www.iea.org>

¹¹ <http://www.cnstock.com/index/cj/201105/1332414.htm>

3 it can be seen that the amount of energy conserved by SOEs was 28% of the total energy saved in China during the 11th FYP.

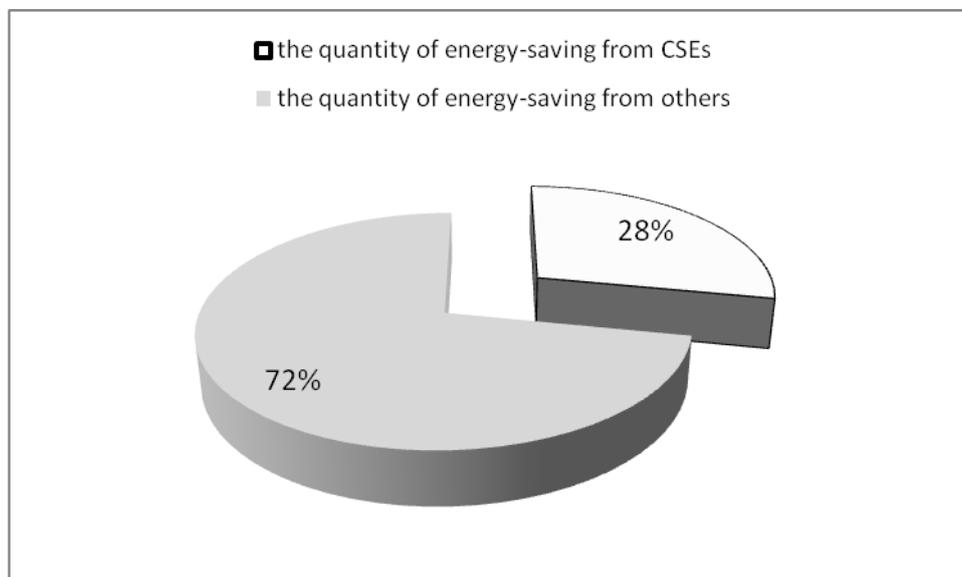


Figure 3. The ratio of the SOEs' energy-saving quantity to the total energy-saving quantity of China in the period of the 11th FYP (2006-2010). Source: <http://www.sasac.gov.cn/>

At present, clean development mechanism (CDM) is still the major mechanism for China to participate in emissions trading. SOEs are active participants in CDM projects to enhance GHG emissions reduction and low-carbon development. For instance, China Hydraulic and Electric Power Ltd. Co., affiliated with China Datang Power Generation Group, has developed the *Xiangyang 400.5 MW-capacity Wind Power* CDM project. Minhe Hydroelectricity Investment Corporation, a subsidiary company of China Guodian Power Corporation, has developed the CDM project of *Yidi Hydropower Station* with the installed capacity of 168 MW. It is estimated that the project would obtain CERs of 530,000 t CO₂e each year⁷.

In summary, SOEs play important roles in the economic and social development in China. Meanwhile, SOEs are large emitters of GHG. Although SOEs have made significant achievement in emission reductions in the last decade, there are still great challenges for SOEs to further reduce GHG emissions. Therefore, it is necessary for

SOEs to find innovative and effective approaches to reduce GHG emissions.

2. ETS Incentives for SOEs

2.1 Background

It is a tremendous challenge for SOEs to reach their 12th FYP GHG emissions reduction targets. SOEs' emissions reduction becomes more and more difficult, mainly due to the shortage of advanced technologies and capital. SOEs are devoted to explore an effective way to reduce GHG emissions. Compared with other instruments, ETS is considered to be more flexible and provide incentives to SOE's participation in the ETS.

SOEs show the distinctive characteristics in comparison with other modern enterprises. SOEs stand the special position in the national economy and market. Participation in ETS by SOEs is critical for the efficiency and success of a national ETS in China.

The special characteristics of SOEs will create new demands on the main elements of ETS. Therefore, the construction of national ETS shall take into account the characteristics of SOEs. Unfortunately, there have been no studies on SOE's participation in ETS. For designing and setting up an effective national ETS, the characteristics of SOEs and the implications should be studied in-depth.

In the following sections, the characteristics of SOEs and the implications on ETS will be studied in detail; in addition, the characteristics of SOEs that hinder or facilitate the effective involvement of SOEs in ETS will be analyzed, and ETS incentive for SOEs will be discussed.

2.2 Objectives

- Study the characteristics of SOEs
- Reveal the influences of these features on ETS

- Discuss ETS incentive for SOEs

2.3 Deliverable(s)

- *Report on the characteristics of SOEs and ETS Incentive for SOEs*

This report will include the following contents:

- (1) The characteristics of SOEs, such as, the regional distribution, property right structure, institutional structure, sectoral structure, operation model, CO₂ emission situation, regulatory system, etc.;
- (2) The necessity and feasibility of SOEs participation in national ETS;
- (3) The analysis of characters that hinder or facilitate the effective involvement of SOEs in national ETS.

2.4 Research Methodology and Activities

2.4.1. Methodology

For the effective involvement of SOEs in ETS, the characteristics of SOEs shall be considered carefully. After literature research and field study of SOEs' situation, the characteristics of SOEs will be comparatively analyzed and studied. The necessity and feasibility of national ETS involving SOEs will be discussed. Subsequently, the SOEs characteristics that hinder or facilitate the effective involvement of SOEs in national ETS will be analyzed. Expert consultation and workshops will be held to further enhance the research.

2.4.2 Activities

- (1) Study the characters of SOEs by literature research and field study, including regional distribution, sectoral structure, institutional structure, property right structure, operation model, regulatory system, CO₂ emissions situation and preparation for ETS, etc. Discuss the influences of these characteristics on the effective involvement of

SOEs in national ETS.

(2) Write *Report on the characteristics of SOEs and ETS Incentive for SOEs*.

(3) Workshop on the characteristics of SOEs and ETS incentive for SOEs.

3. Study and Suggestion of Main Elements for SOEs' Participation in China ETS

The main elements of China ETS are discussed in previous sections. Generally speaking, SOEs, as major participants, must follow the rules and regulations of national ETS. For the effective operation of ETS, the design elements of the ETS should consider the characteristics of SOEs. After study and analysis of the SOEs' features, the design of institutional elements for the effective involvement of SOEs in ETS should be studied in-depth.

SOEs, as indispensable participants of ETS, are special enterprise groups that have some distinctive characteristics in comparison with the conventional enterprises. This will result in new demands for scoping SOEs in ETS. SOEs show special features in property rights, operation model, industrial structure and regulatory system. Normally, SOEs cover diversified economy and productions. Its business and production may cover many sectors and services. In addition, SOEs have complex property right structure, which is composed of multi-level subsidiaries. Moreover, the property right of the subsidiary enterprises varies with the development and reform of the SOEs. Especially, some large-scale subsidiary enterprises with a great deal of GHGs emissions are not entities with legal personality. These characteristics of SOEs will affect, for example, definition of “entities covered under ETS”.

In this section, the research proposal of the implications of SOEs' characteristics on the main element of ETS, such as, coverage and scope, allowance allocation, MRV system

and regulatory system, will be laid out. Based on the research results, suggestions on the design of main elements for the effective involvement of SOEs in ETS will be proposed.

3.1 Coverage and Scope

3.1.1. Background

The coverage and scope of the ETS is the foundation of emission cap and allowance allocation. The coverage and scope firstly should be set up at the initial stage of building ETS. Generally speaking, the coverage and scope of ETS at least should include four factors, namely, region, industry/sector, the type of GHGs and enterprise/installation. In previous sections, the proposal on the study and design of the coverage and scope for ETS is drafted. Within the framework laid out before, specific studies will be carried out in relation to SOE's participation in ETS, including the type of GHGs, the industry/sector and enterprise/installation in ETS.

The amount and sources of emission should be considered for setting the coverage and scope. In addition, the cost and potential of GHGs emissions reduction are important factors to design the coverage and scope of ETS. SOEs may release different GHGs emissions in the process of production and operation, which make the scope of GHGs complicated. For instance, Sinopec group produces hundreds of chemicals and emits a large quantity of CO₂, N₂O and CH₄, etc. Moreover, the different subsidiary enterprise/installation emits different kinds of GHGs. Due to the large amount of diversified GHGs emissions from SOEs, the amount and types of GHGs covered by ETS should be studied in-depth.

Moreover, SOEs are large-scale group companies, whose operation and production involve a lot of sectors/industries. For example, China Minmetals Corporation, a well-known SOE, carries out core business of mineral production, trading and comprehensive services, and secondary business of finance, real estate and logistics

industry. Hence, the types of industries/sectors involving ETS and benchmark of the industries/sectors are the key issues for the effective involvement of SOEs in ETS.

The setting coverage and scope of ETS is more and more challenging with the increasing number of greenhouse gas and industry/sector. Therefore, it is necessary to study the implications of SOEs' characteristics on the ETS coverage and scope for the effective involvement of SOEs in ETS.

3.1.2. Objective

- Analyze the emission profiles of SOEs.
- Reveal the influences of SOEs' characteristics on the scope of national ETS.
- Make suggestion on the design of the scope for effective involvement of SOEs in national ETS.

3.1.3. Deliverables

- *Report on the Scope of Effective Involvement of SOEs in national ETS.*

This report will include the following contents:

- (1) The implications of SOEs' characteristics on the scope of ETS, such as, the type of GHGs, the industry/sector and the benchmark of the industry/sector for national ETS, etc.
- (2) Suggestion on the design of the scope for the effective involvement of SOEs in national ETS.

3.1.4. Research methodology and activities

3.1.4.1. Methodology

In this section, a series of methods, such as, literature research, field study, expert consultation, and comparative analysis etc., will be applied to qualitative and quantitative study on the characteristics of SOEs and the influences of their

characteristics on the national ETS. SOEs with high energy consumption, large emission and pollution profile will be selected as key enterprises for study.

Firstly, the general overview of the coverage and scope of overseas ETS and domestic pilot ETS will be gained by literature research and field study. Subsequently, the emission profiles of SOEs, such as, emission sources, the type and amount of GHGs emissions, the cost and the potential of emissions reduction, etc., will be qualitatively and quantitatively analyzed. Based on the results, suggestions on the design of the coverage and scope will be made for the effective involvement of SOEs in national ETS.

3.1.4.2. Activities

(1) Carry out literature research and field study on the coverage and scope of overseas ETS and Chinese pilot ETS.

(2) Research on implications of the SOEs' characteristics on the main elements of ETS scope.

(3) Make suggestion on the design of the coverage and scope for the effective involvement of SOEs in national ETS.

(4) Hold workshop and expert consultation on the influences of the SOEs' characteristics on the scope.

(5) Make suggestion on the design of the scope of national ETS.

(6) Write *Report on the Scope of national ETS Involving SOEs*.

3.2 Allowance Allocation

3.2.1. Background

Allowance allocation is one of the essential conditions of ETS in a cap & trading scheme. Since allowance allocation is a kind of property allocation, it has great

influences on the cost and the benefit of emissions reductions. At the same time, allowance allocation shows the direction of emissions reduction and economic development. In order to successfully run ETS, it is necessary that allowance allocation is efficient, fair, open and transparent.

The more applicable and effective methodology of allowance allocation should be used because SOEs present different characteristics from other modern enterprises. SOEs, as the major entities of national ETS, should abide by the method of allowance allocation of China ETS. However, for the effective involvement of SOEs in ETS, the influences of SOEs' characteristics on the allowance allocation should be studied to design more efficient allowance allocation.

SOEs do not only possess large-scale economy and high emission characteristics, but also present specifics in property right structure and complex enterprises management models. Normally, a SOE has complex property right structure and multi-level management model. Some second-level and third-level enterprises belonging to the SOEs produce large quantity of GHGs emission; however, they are non-legal-person enterprises. For example, China National Offshore Oil Cooperation (CNOOC) has 7 second-level enterprises and 130 third and fourth-level enterprises. These subsidiary enterprises are not legal person entities. In addition, these subsidiary enterprises are all important emission sources and have different cost and potential of emissions reduction. Moreover, the subsidiary enterprises belonging to SOEs locate in different regions with various status on economic development, energy consumption structure and sectoral structure. The allowance allocation to SOEs becomes much complex because the subsidiary enterprises in different regions have different cost and potential of emissions reduction.

SOEs have strong innovation capability and develop in fast speed. Technical advance and elimination of backward production capacity in SOEs directly induce issues of treating “new entrant” and “exit” in ETS. Whether “new entrant” or “exit”, the

allowance allocation have to consider the change of emissions reductions capability in SOEs. Hence, it is necessary to carry out thorough researches and analyses on the influences.

In summary, the methodology of allowance allocation for SOEs composed of multi-level enterprises should be applied carefully to ensure the fair allowance allocation. Subsequently, suggestions on the design of allowance allocation for the effective involvement in SOEs in national ETS will be put forward.

3.2.2. Objective

- Study the influences of SOEs' characteristics on the allowance allocation of ETS.
- Put forward suggestions on the design of allowance allocation for effective involvement of SOEs in national ETS.

3.2.3. Deliverables

- *Report on Allowance Allocation for Effective Involvement of SOEs in national ETS.*

This report will include the following contents:

- (1) The influences of SOEs' characteristics on allowance allocation of ETS, including methodology, procedure, principle, ratio of free allowance and auction allowance, etc.;
- (2) Suggestions on the design of allowance allocation for the effective involvement of SOEs in national ETS.

3.2.4. Research methodology and activities

3.2.4.1. Methodology

In this section, methods, such as, literature research, field study, expert consultation, and comparative analysis, etc., will be applied to a qualitative and quantitative study on the influences of SOEs' characteristics on the allowance allocation of ETS.

Firstly, the general overview of the allowance allocation of overseas ETS and Chinese

pilot ETS will be summarized by literature research and field study. Subsequently, the influences of SOEs' characteristics, such as, the property right change, "new entrant" and "exit", regional distribution, etc., on the main elements of allowance allocation, such as, methodology, procedure, standard and principle, ratio of free allowance and auction allowance, will be qualitatively and quantitatively analyzed. Based on the results, suggestions on the design of allowance allocation will be made for the effective involvement of SOEs in national ETS.

3.2.4.2. Activities

- (1) Carry out literature research and field study on the allowance allocation of overseas ETS and Chinese pilot ETS.
- (2) Research on the influences of the SOEs' characteristics on the main elements of allowance allocation.
- (3) Make suggestion on the design of allowance allocation for effective involvement of SOEs in CN ETS.
- (4) Hold workshop and experts consultation on the influences of the SOEs' characteristics on allowance allocation.
- (5) Write *Report on Allowance Allocation for the Effective Involvement of SOEs in National ETS*.

3.3 Monitoring, Reporting and Verification (MRV) System

3.3.1. Background

MRV system plays fundamental and important role in the successful operation of ETS. The accurate and effective monitoring, reporting and verification on the GHGs emissions are not only important base for fair and scientific allowance allocation, but also ensure the real and measurable emissions reduction and compliance.

SOEs cover diversified industries/sectors; therefore, the different SOEs produce

different types and amount of GHGs emissions. On the other hand, SOEs have set up their own management institution, that is, self-management and the supervision of both the central government and local governments. A SOE has multi-level and complex organization structure. Some subsidiaries of a SOE are organized as holding companies and/or listed companies, while other subsidiaries outside of the holding companies/listed companies are still independent legal persons. These characters may need specific requirements on the MRV system for the effective involvement of SOEs in national ETS.

SOEs have existing sound energy consumption management system for monitoring, reporting and verification of energy consumption. They are experienced in data collection and documentation of the types of fuel consumed, fuel heat values, carbon content, etc. SOEs are also subject to tight supervision on energy reporting by central government bodies. MRV system for the effective involvement of SOEs in ETS shall build upon the basis of the existing energy consumption management system to improve efficiency. Therefore, SOEs are in a better place for building MRV system than other companies.

A MRV system for national ETS involving SOEs has not been set up yet. Therefore, it is necessary to study the MRV system for the effective involvement of SOEs in national ETS. In this section, the influences of SOEs characteristics on the principle, qualification and procedure of the MRV system will be studied in depth. Based on the results, suggestions on the design of MRV system for the effective involvement of SOEs in national ETS can be made.

3.3.2. Objective

— Study the implications of SOEs' characteristics on the MRV system for national ETS.

- Make suggestions on the design of the MRV system for effective involvement of SOEs in ETS.

3.3.3. Deliverables

- *Report on the MRV System for Effective Involvement of SOEs in National ETS.*

This report will include the following contents:

- (1) The influences of SOEs' characteristics on the MRV system of ETS, including the principle, qualification, activities and procedure, etc.;
- (2) Suggestion on the design of the MRV for the effective involvement of SOEs in national ETS.

3.3.4. Research methodology and activities

3.3.4.1. Methodology

In this section, the methods, such as, literature research, field study, expert consultation, and comparative analysis, etc., will be applied to qualitatively and quantitatively study the influences of SOEs' characteristics on the MRV system of ETS.

Firstly, the general overview of the MRV system of overseas ETS, Chinese pilot ETS, as well as energy consumption management system for SOEs will be summarized by literature research and field study. Subsequently, the influences of SOEs' characteristics, such as, the property right structure, regional distribution, industry/sector structures, and enterprise management institution, etc., on the main elements of MRV system, such as, the principle, qualification, activities and procedure, will be analyzed. Based on the results, suggestions on the design of the MRV system will be made for the effective involvement of SOEs in national ETS.

3.2.4.2. Activities

- (1) Carry out literature research and field study on the MRV system of overseas ETS and Chinese pilot ETS.

(2) Research on the influences of the SOEs' characteristics on the main elements of MRV system.

(3) Make suggestions on the design of the MRV system for effective involvement of SOEs in national ETS.

(4) Hold workshop and expert consultation on the influences of the SOEs' characteristics on the MRV system.

(5) Write *Report on the MRV System for Effective Involvement of SOEs in National ETS*.

4. TOR

Objective(s) and Rationale

Objectives	Rationale
<p>ETS incentive for SOEs</p> <ul style="list-style-type: none"> • Reveal the characteristics of SOEs including property rights structure, industrial structure, operation model, regulatory system, CO₂ emissions status and preparation for ETS, etc. • Discuss the necessity and feasibility of the involvement of SOEs in national ETS. 	<ul style="list-style-type: none"> √ SOEs show the distinctive characteristics comparing with other modern enterprises, but these characteristics have not been studied well. √ SOEs are major participants in national ETS because of their economy size and GHGs emissions. √ SOEs' emission characteristics make new demands on the main elements of ETS.
<p>Coverage and scope</p> <ul style="list-style-type: none"> • Study the influences of SOEs' characteristics on the coverage and scope of national ETS, and make suggestion on the design of the coverage and scope for the effective involvement of SOEs in ETS. 	<ul style="list-style-type: none"> √ The coverage and scope of national ETS should be available for the SOEs as important participants. √ The allowance allocation of national ETS should be available for the SOEs as important participants.
<p>Allowance allocation</p> <ul style="list-style-type: none"> • Study the influences of SOEs' characteristics on the allowance allocation of national ETS, and make suggestion on the design of allowance allocation for effective involvement of SOEs in national 	<ul style="list-style-type: none"> √ The MRV system of national ETS should be available for the SOEs as important participants. √ The regulatory system of national ETS should be available for the SOEs as important participants.

ETS.	
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Deliverable(s)

Deliverable(s)	Description	Party Responsible for Ensuring Action
Report on the characteristics of SOEs and ETS incentive for SOEs	See the main text	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.
Report on the coverage and scope of national ETS Involving SOEs		
Report on Allowance Allocation for Effective Involvement of SOEs in national ETS.		
Report on the MRV System for Effective Involvement of SOEs in national ETS		
Report on the Regulatory System for the Effective Involvement of SOEs in national ETS		

Timeline for Completion

Deliverable(s)	Time Required for Completion(days)	Completion Date
Report on the characteristics of SOEs and ETS incentive for SOEs	180	0.5 year
Report on the coverage and scope of national ETS Involving SOEs	360	1 year
Report on Allowance Allocation for the Effective Involvement of SOEs in national ETS.	360	1 year
Report on the MRV System for Effective Involvement of SOEs in national ETS	360	2 year

Budget

Activity	Estimated Cost (in US\$)				
	Year 1	Year 2	Year 3	Total
ETS incentive for SOEs					
<ul style="list-style-type: none"> Study the characteristics of SOEs by literature research and field study and discuss the influences of these characteristics on ETS 					
<ul style="list-style-type: none"> Write Report on the characteristics of SOEs and ETS incentive for SOEs 					
<ul style="list-style-type: none"> Workshop and experts consultation on the characteristics of SOEs and ETS incentive for SOEs 					
Coverage and scope					
<ul style="list-style-type: none"> Carry out literature research and field study on the coverage and scope of overseas ETS and Chinese pilot ETS. 					
<ul style="list-style-type: none"> Research on the influences of the SOEs' characteristics on the main elements of the coverage and scope. Make suggestion on the design of the coverage and scope for effective involvement of SOEs in national ETS. 					
<ul style="list-style-type: none"> Hold workshop and experts consultation on the influences of the SOEs' characteristics on the scope and make the suggestion on the design of the coverage and scope of national ETS. 					
Allowance allocation					
<ul style="list-style-type: none"> Carry out literature research and field study on the allowance allocation of overseas ETS and Chinese pilot ETS. 					
<ul style="list-style-type: none"> Research on the effects of the SOEs' characteristics on the main elements of allowance allocation. Make suggestion on the design of allowance allocation for the effective 					

involvement of SOEs in national ETS.					
<ul style="list-style-type: none"> Hold workshop and experts consultation on the influences of the SOEs' characteristics on allowance allocation and make suggestion on the design of the allowance allocation of national ETS. 					
MRV system					
<ul style="list-style-type: none"> Carry out literature research and field study on the MRV system of overseas ETS and Chinese pilot ETS. 					
<ul style="list-style-type: none"> Research on the influences of the SOEs' characteristics on the main elements of MRV system. Make suggestion on the design of the MRV system for effective involvement of SOEs in national ETS. 					
<ul style="list-style-type: none"> Hold workshop and expert consultation on the influences of the SOEs' characteristics on the MRV system and make suggestion on the design of MRV system of CN ETS. 					
TOTAL BUDGET	200,000	200,000	100,000		500,000

Sources of Funding	Total (USD)
National Government	0
PMR	500,000
Other (if applicable)	0
Grand Total	500,000

Building Block 6: Analysis on Key Issues of China's Power Sector Participating in China ETS

1. Policy Background

1.1 Objectives and Actions for Addressing Climate Change

As a key industry of the national economy, the power sector undertakes the mission to guarantee stable and reliable supply of electricity. By the end of 2011, the China's total installed capacity had reached 1.06 billion kW. The national electricity generation kept rapid growth speed. The total electricity generation amounted to 4,700 billion kWh in 2011. The length of power transmission lines of 220 kV or above and the capacity of transformer equipment of 220kV or above had separately reached 490 thousand km and 2.3 billion kVA by the end of 2011. The scale of China's power grid had ranked the top for three years. What's more, the installed capacity of China had been ranked second for sixteen years and is near to USA.

Coal is the primary energy source and is dominant in the source of power generation in China. By the end of 2011, the installed capacity of coal fired units had reached 0.7 billion kW, accounting for 66% of China's total installed generation capacity. The coal-electricity generation reached 3,600 billion kWh, accounting for 77% of China's total electricity generation.

However, China has made new achievements to adjust its power structure in recent years. First, the structure of generator units has been continuously optimized. The construction of thermal power plants continued to develop towards large capacity, high parameters and environment-friendly type. Till the end of 2011, 39 sets of 1 million kW class ultra-super critical thermal power units had been put into operation. Currently

China's power sector ranks top in the world in terms of new super and ultra-super critical units. Second, the proportion of the electricity generated from clean energy has further increased. With many projects put into operation, the hydroelectric power was experiencing a staged boom, and its capacity had reached 0.23 billion kW; the development of nuclear power also continued to speed up, and the installed capacity of nuclear power has reached to 12.57 million kW; the installed capacity of the grid-connected wind power amounted to 46.23 million kW; considerable photovoltaic electricity generation projects were about to come into operation.

1.2 Status of Greenhouse Gas Emissions in China's Power Sector

As coal-fired power occupies a dominant position in China's energy structure, China's power sector is not only a great consumer of energy but also a major producer of carbon dioxide emission with the emission amounts, and its emission of carbon dioxide accounts for 40% of the total carbon dioxide emissions from energy consumption in China. The statistics from IEA indicates that China's unit carbon dioxide emissions for coal-fired power generation have been decreasing constantly since 2004. Compared with 937g/kWh in 2005, this indicator was 900g/kWh in 2008, even lower than 901g/kWh of the USA in 2008. Also, the effects of China's power structure adjustment have been so significant that the carbon dioxide emission intensity has been decreasing continuously since 2005; the figure was 745g/kWh in 2008, 61g/kWh less than that in 2005. However, going forward there are tremendous challenges in reducing emission intensity in part due to the high share of coal in China's energy mix..

1.3 Measures and Objectives for Controlling Greenhouse Gas Emissions by China's Power Sector

1.3.1 Measures for controlling greenhouse gas emissions by China's power sector

The power sector can actively tackle climate change and effectively control greenhouse gas emission by adopting measures in terms of structure, engineering technology,

management and market mechanism.

Actively promoting the structure adjustment of power sector. First, there should be more electricity generated by non-fossil energy, such as hydroelectric power, nuclear power and wind power and more small units should be shut down; the development and construction of large power bases, such as hydroelectric power should be accelerated, too. By these ways,, the power structure would be optimized and emissions would be reduced. By the end of 2011, the installed generation capacity of non-fossil fuel had accounted for 27.7% of the total installed capacity in China, which was 3.4 percent more than that in 2005. Second, thermal power units made more achievement and developed towards large capacity, high parameters and environment-friendly type. By the end of 2011, the generation capacity of the 300 MW unit or above had accounted for 75% of the operational thermal power units, and this scale will be increased in the future.

Promoting engineering technical retrofit and application. First, it is important to organize the units in service to conduct technical retrofit for energy conservation to reduce unit energy consumption continuously, and there are a lot of ways, such as steam turbine flow path retrofit, variable frequency retrofit of pump and fan, retrofit of micro oil ignition and plasma ignition. Second, it is necessary to promote the carbon capture technology. A 250 MW IGCC demonstration project has been put into operation in Tianjin; 3 carbon dioxide capture demonstration projects , the Huaneng Beijing Thermal Power Plant, Shanghai Shidongkou No. 2 Power Plant and Chongqing Hechuan Shuanghuai Power Plant have been put into operation; the discussion on international cooperation in oxygen-enriched combustion is also being undertaken.

Strengthening the establishment and management mechanisms. First, management mechanism should be strengthened. The power sector issued the *Guidelines for Combating Climate Change by the Power Sector*, in which the situation faced by the power sector in combating climate change is stressed and analyzed, and in which

main tasks, work principles and guarantee mechanism are also defined; the *guidelines* has played the regulating and guiding role in such work by the power sector. More similar work will be done to provide more proper guidelines and policy supports in building the mechanism. Second, management approaches can be used to reduce the emissions in the whole process from production to consumption of the energy. They mainly include energy-saving electricity generation & dispatching, generation rights trading, energy efficiency benchmarking and demand side management.

Playing the role of the market mechanism role to reduce emissions This mainly refers to emissions trading. Currently, the power sector adopts the Clean Development Mechanism (CDM) in international cooperation to reduce carbon dioxide emissions by obtaining certified emission reduction amounts through transferring funds and technology.

1.3.2 Relevant objectives of controlling greenhouse gas emissions by China's power sector

During the Twelfth Five-year Plan Period, on the one hand, the power sector further controls carbon dioxide emissions mainly by adjusting power structure, improving electricity generation efficiency and conducting energy conservation management; on the other hand, the power sector seeks to establish an emissions trading market. The carbon trading mechanism can encourage power enterprises to develop themselves in the way fitting their local environment and characteristics, so that it will be easier to maximize “cost-effectiveness” of controlling carbon dioxide emission.

The power sector hasn't formulated greenhouse gas emission reduction target , but the “*Twelfth Five-year Plan*” on Energy Conservation and emission Reduction promulgated by the State Council in August of 2012 specified the coal consumption rate for thermal power plants, the auxiliary power rate of thermal power plant, grid line loss rate and so on. These indexes are closely related to the emission of greenhouse gas.

The indexes are given in Table 1-1.

Index	Unit	2010	2015	Change range/change rate
Gross coal consumption rate for thermal power supply	g of coal equivalent (gce) /kWh	333	325	-8
Auxiliary power rate of thermal power plant	%	6.33	6.2	-0.13
Grid line loss rate	%	6.53	6.3	-0.23

1.4 Main Influencing Factors and Policies of Greenhouse Gas Control in the Power Sector

1.4.1 Main influencing factors

(1) Development is still the top priority of Chinese power sector.

Over the past 60 years the installed capacity of power plants and electricity generation has grown rapidly to close the gap of insufficient supply of electricity. To date, the demand for electricity for economic and social development has been basically met. However, in general, the electricity supply and demand of China is still tight, and structural shortage of electricity occurs in some regions. There is still a considerable gap between China and developed countries in the indicators of installed capacity per capita and power consumption per capita. The installed capacity per capita of China is about 1/6 of that of the USA, 1/3 of Japan and 1/2 of Korea; the power consumption per capita of China is about 1/5 of that of the USA, 1/3 of Japan and 1/3 of Korea. Now China is at the crucial stage of rapid industrialization and urbanization, the demand for electricity will continually grow; the guarantee of enough electricity supply is still the top priority of China's power sector.

(2) China's electricity price level shall be raised.

Due to the electricity price-formulating mechanism of China the power generation

enterprises are confronted by considerable resistance when trying to transfer emission reduction cost to downstream consumers.

The existing electricity price system of China, in terms of link, includes feed-in tariff, transmission-distribution tariff, retail tariff, and electricity purchase price for large users. Among them, the feed-in tariff and the retail tariff have separate forms, while no independent pricing mechanism has been established for the transmission-distribution tariff. The feed-in tariff is mainly set by the government and the pricing form includes power prices for operation period, benchmark price, linkage between coal price and power price, as well as market pricing, such as pricing by bidding and pricing through negotiation for trans-province electricity rights trading. The transmission-distribution tariff is divided into three levels, trans-region grid, trans-province grid and provincial grid. The price of the trans-region grid and the trans-province grid is set by the government or through internal negotiation in the enterprise; the pricing for the provincial grid is mainly in the form of the difference between purchase price and sale price. The retail tariff is set by the government, and classified according to the nature and use of power consumption and graded according to the voltage level. The power purchasing price for large users, only implemented in a few regions as pilot work, adopts pricing by bilateral negotiation.

It can be seen that, the power price of the electricity generation enterprises in China is fixed. However, to attain the energy conservation target and ensure electricity supply, the electricity generation enterprises have to adopt clean energy electricity generation technology or carbon capture technology to reduce its emissions or adopt emissions trading to achieve emission reduction target. All these will increase their operation costs. According to international experience, the added costs will be shifted to the power price. However, China has not established a market based pricing mechanism and a transfer mechanism. As a result, the increased costs cannot be shifted into the power price. The feed-in tariff and retail tariff are mainly set by the government; the space for the transmission-distribution tariff is compressed by the said two types of

tariffs. The established system for the linkage between coal price and power price is not complete, and for certain reasons, the system was not timely or properly implemented. In addition, as the coal price rises rapidly, the power enterprises run into difficulty in production and operation, many electricity producers are in serious deficit. With a debt ratio of up to 80%, the power enterprises suffer insufficient capital liquidity, poor profitability, backward industrial upgrading and limited sustainable development capacity. If emission reduction costs are taken into account, the enterprises are in straitened circumstances. Without fundamental reform of the current system participation in China's national ETS by the power sector will be severely constrained.

(3) The space for controlling greenhouse gas emissions purely by administrative orders gradually reduces and the market mechanism is strongly required

China's power technology level has basically reached the internationally advanced level, and the installed capacity constructed in the past 10 years accounted for over 60% of China's total installed capacity. In 2011, the coal consumption rate for power supply in China's thermal power units was 329 gce/kWh, which is now among the front ranks of the world; the line loss rate was 6.52%, ranking one of the best among the countries with equivalent power supply load density. The space for energy conservation and emission reduction of power sector gradually shrunk, therefore, the costs for the greenhouse gas emission reduction will increase significantly by administrative orders such as structural adjustment, technical retrofit and optimization of operation would increase considerably. Even so administrative approaches may not be effective. .

(4) The administrative allocation mode is adopted for the on-grid electricity.

China's electricity allocation mechanism is that the provincial economy authorities (vary in different provinces, such as, provincial economic and information commission, provincial economic and trade commission or provincial development and reform commission) formulate an annual electricity generation amount plan, and allocate to power plants yearly, so the annual electricity generation amount of the power plant is

relatively fixed.

1.4.2 Relevant policies on controlling greenhouse gas emissions by China's power sector

At present, no GHG emissions controlling policy has been issued in China's power sector, however, an array of policy measures concerning energy conservation and pollutant control formulated by the power authority for energy conservation and emission reduction would be very helpful to reduce greenhouse gas emission to varied extents, so they can be regarded as a part of the policy of the power sector to combat climate change.

(1) Planning of the power sector

Considering China's economic and social development objectives, national energy strategy, and the regular patterns and features of the power sector, the state formulated the energy and power development plan and planned resource protection, structure adjustment, environmental protection, technical advancement, benefit improvement, fund demand, equipment manufacture, power conservation to solve the problems in the development of the power sector and realize safe, steady and reliable electricity supply. Among other things, the "resource saving" and "saving is priority" principles were determined in the plan.

In 2006, "*The Twelfth Five-Year Plan for National Economic and Social Development of the People's Republic of China*" was published by the state, which defined the development direction of the power sector "to develop clean, efficient and large capacity coal fired units, to actively develop hydroelectric power on the condition that the ecology is protected and relevant people are resettled, to develop nuclear power efficiently on the condition that safety is ensured, to actively develop solar energy, biomass energy, geothermal energy and other new types of energy". In 2007, the State Council reviewed and in principle passed the *Medium and Long Term Plan on the*

Development of Renewable Energy, in which the proportion of renewable energy in the energy structure was improved. The *Medium and Long Term (2005~2020) Plan for the Development of Nuclear Power* approved by the State Council in November of 2007 stated that nuclear power construction shall be promoted by realizing leap-forward development of nuclear power technology. In 2013, China issues “the *Twelfth Five-Year of energy planning*”, which puts forward the main target for the energy development: In the field of total energy consumption and efficiency, to execute the policy of controlling energy consumption intensity and total energy consumption. The detailed target is as follows: Total energy consumption is 4 billion tce, the electricity consumption is 6.15 trillion kWh and the energy consumption per GDP decreases by 16% compared with that in 2010; the consumption proportion of non-fossil fuels increases by 11.4% and the proportion of installed capacity for power generation by non-fossil fuels reaches 30%; the consumption of natural gas in the energy consumption reaches 7.5%. In the power sector, till 2015, the installed power capacity reaches 1.49 billion kW, of which coal fired power generation is 960 million kW, natural gas power generation is 56 million kW, hydro- power generation is 290 million kW, the nuclear power generation is 40 million kW, wind power generation is 100 million kW and solar power generation is 21 million kW. The implementation of these plans will provide great impetus to the development of China’s power generation and consumption patterns toward low carbon and clean type.

(2) Rules on energy-saving dispatching

In August, 2007, the National Development and Reform Commission, the State Environmental Protection Administration, the State Electricity Regulatory Commission and the State Energy Administration Office jointly issued the *Method for Energy-Saving Electricity Generation and dispatching (for trial implementation)*, which provides the rules for energy-saving electricity generation and dispatching. In December, 2007, the National Development and Reform Commission, the State Environmental Protection Administration, the State Electricity Regulatory

Commission and the State Energy Administration Office jointly issued the *Pilot Program on Energy-Saving Electricity Generation and Dispatching* and the *Detailed Rules on the Implementation of the Method for Energy-Saving Electricity Generation and Dispatching (for trial implementation)*, which determined five provinces, including Guizhou, Sichuan, Guangdong, Jiangsu and Henan, for the pilot work of energy-saving electricity generation and dispatching. In 2010, through energy-saving dispatching, 3.89 million tce were conserved and 10.12 tons of carbon dioxide emissions were reduced.

The energy-saving electricity generation and dispatching, with reliable electricity supply guaranteed, and in accordance with the principle of energy conservation and economy, means giving priority to the dispatching of renewable energy power, and then distribute fossil fuel power with lower consumption and less emission according to the unit energy consumption and pollutant emission level, thereby minimizing energy & resource consumption and pollutant emission. The energy-saving electricity generation and dispatching are proposed to tackle the following problem: the old averaging electricity generation and dispatching in China are not beneficial to resource conservation and energy consumption reduction. Under the existing pricing mechanism, some small thermal power generating units that produce much pollution and consume much energy can feed electricity into the grid at a low price since their fixed assets have undergone full depreciation, while the efficient and environment-friendly large thermal power units, due to large investment, high costs and high electricity generation price, can hardly give their electricity generation capacity into full play, even some hydroelectric power units or nuclear power units cannot feed electricity into the grid owing to the restriction by the “dispatching plan”, thereby resulting in waste of energy resources.

(3) Policy on the closedown of small thermal power generating units

During the “Tenth Five-year Plan”, China devoted great effort to implement the policy

on the close-down of small thermal power plants, but produced undesirable effect. On January 20, 2007, the State Council approved the *Several Opinions on Accelerating the Close-down of Small Thermal Power Generating Units* submitted by the National Development and Reform Commission and the State Energy Administration Office, and passed it on to those concerned, which marked the resumption and acceleration of the close-down of small thermal power generating units that had been stagnant in the “Tenth Five-year Plan”. According to this document, the objective of closing down at least 50 million kW small coal-fired power generation units shall be attained during the “Eleventh Five-year Plan”. Besides, there were three supporting measures. First, the departments shall cooperate in the close-down of small thermal power generating units. For the expired unit to be closed down, the electricity regulating authority shall timely revoke the power business permit of such unit; the grid enterprise and relevant entities shall disconnect the unit from the grid and shall not purchase the electricity from the unit; the power distribution organization shall not dispatch the unit to generate electricity; such financial institution as the bank shall stop providing loan to the unit. Second, the incentive system of both “installing large units” and “closing small units” is adopted. The development and reform commission linked project constructing with closing; that is, when 240 MW small units are closed down, a 300 MW unit may be constructed; when 420 MW small units are closed, a 600 MW unit may be constructed; when 600 MW small units are closed, a 1000 MW unit may be constructed. Third, the feed-in tariff of small thermal power generating unit is reduced; introduce the transfer of small unit electricity generation rights. Promote the close-down of small thermal power generating units by reducing small thermal power generating units’ feed-in tariff and strengthen monitoring and verification of pollutant emission from power plants, and levying fund and extra charges specified by the state for the electricity generated by the self-supply power plant for self-use. The small thermal power generating unit that is closed in advance on schedule may transfer the electricity generation allowance to large units at the feed-in tariff no higher than the price drop. With many measures in effect,

China has successfully closed down 76.83 million kW small power generation units and it is expected at least 20 million kW of small power generation units will be closed down in 2010 to 2015.

(4) Renewable Portfolio Standard

The Renewable Portfolio Standard (RPS) means that to promote the development of renewable energy, a country or region makes statutory provisions on the proportion of electricity generation from renewable energy in the total electricity supply and the electricity price is determined by the market. Renewable energy has been the focus of China's energy policy development for past few years. The *Electric Power Law of the People's Republic of China* promulgated in 1995 states that government shall encourage electricity generation from renewable and clean energy, support utilization of solar energy, wind energy, geothermal energy, biomass energy and other types of energy for rural power source construction and for the increase of electricity supply in rural areas. China's "*Ninth Five-year Plan*" on *National Economic and Social Development and Outline on the Long Term Target of 2010*, approved by the fourth meeting of the Eighth National People's Congress, decided the energy development strategy of "centering on electricity, basing on coal, strengthening the exploration and development of petroleum and natural gas, actively developing new energy and improving the energy structure"; in the section of power development and in expounding rural energy, it emphasized the necessity of developing small hydro energy, wind energy, solar energy, geothermal energy and biomass energy according to local conditions.

The *Medium and Long Term Plan on the Development of Renewable Energy* issued by the National Development and Reform Commission in 2007 proposed to strive to raise the consumption of renewable energy to 10% of total energy consumption in 2010 and 15% in 2020. The *Renewable Energy Law* passed in early 2005 and implemented since January 1, 2006 established the Renewable Energy Target Policy: the state should put

forward the target for development and utilization of renewable energy and take corresponding measures to promote the establishment of a renewable energy market. The adoption of target policy gives a clear signal to the market what is supported, encouraged or restricted by the state in certain period, and also guides the investment direction. Besides, the *Renewable Energy Law* specified four other systems:

(1) Mandatory feed-in system: The grid enterprise shall fully purchase the feed-in electricity generated from renewable energy within its grid coverage and provide the service for feeding electricity into the grid.

(2) Classified power price system: The feed-in price of a renewable energy electricity generation project is set by the price authority of the State Council, according to the principle of economy and reasonableness to the advantage of the development and utilization of renewable energy.

(3) Cost sharing system: The price difference between renewable energy power and conventional power purchased by the grid will allocate in the retail price. The reasonable grid accessing costs paid for renewable energy are included in the cost of the grid enterprise.

(4) Special fund system: Lack of effective and sufficient fund support has always been a major obstacle to develop and utilize renewable energy. While the establishment of cost sharing system has solved the problem of extra-cost of power generation from renewable energy, the fund bottleneck problem in the development and utilization of renewable energy still needs special channels, so the laws advance the establishment of special fund for renewable energy, which are used for the subsidy, allowance and other forms of fund support of the renewable energy development and utilization projects out of the cost sharing system.

With the abovementioned five systems, China basically forms the policy framework to support the development of new energy and renewable energy.

(5) Generation rights trading

The trading of power generation rights is a trading behavior to realize replacement of power amount among generator units and power plants through market mechanism. The amount involved in generation rights trading includes various types of electricity contract, which mainly refers to the electricity generation allowance assigned by provincial government. In principle, the generation rights trading is to replace inefficient and pollution intensive thermal power generation units with efficient and environment-friendly units, such as clean energy generation units including hydroelectric power and nuclear power plants. Being an exclusive electric energy trading type, the generation rights trading originated from the “replacement of thermal power with hydroelectric power” was firstly introduced by Sichuan Province in 1999 and further developed under the national energy conservation and emission reduction policy since the “Eleventh Five-year Plan”. In 2011, the traded electricity exceeded 107.5 billion kWh; according to calculation, 8.35 million tce were saved, correspondingly, 21.90 million tons of carbon dioxide emission was reduced.

1.5 Experience of the Carbon Market

To combat climate change and reduce greenhouse gas emission, China not only issues administrative orders and takes technical emission reduction measures, but also promotes market mechanism to reduce greenhouse gas emissions; in particular, the market mechanism can help to achieve emission reduction objectives at lower cost, so that the cost of enterprise, the sector and the society in reducing greenhouse emission would be reduced.

Clean Development Mechanism (CDM) project. The power sector has enormous potential in greenhouse gas emission reduction and is also a key field of China to develop CDM projects. Up to July 2, 2012, there were about 1928 registered CDM projects in China’s power sector, accounting for 92% of all registered projects. Among these projects, the hydroelectric power projects accounted for around 44%, and the

wind power projects accounted for around 38%. With respect to the development of CDM methodology, China's participation also increased. China has successfully developed two methodologies for the power sector, the "Consolidated baseline and monitoring methodology for new grid connected fossil fuel fired power plants using a less GHG intensive technology" (ACM0013) and "New natural gas based cogeneration plant" (AM0107), which cleared the obstacle of no available methodology for large number of projects applying for CDM support.

Pilot work of carbon emissions trading. The pilot work of carbon emissions trading in 7 provinces or cities, covers the method to monitor and report emissions in the power sector.

2. Project Objective

2.1 Project Background

The power sector is not only a major consumer of primary energy but also a major generator of carbon dioxide emission, and its emission of carbon dioxide accounts for 40% of the total emissions from fossil fuel consumption in China. It is the key sector for saving energy, reducing emission and tackling climate change. Therefore, it is of profound significance to establish a carbon trading market for the power sector. The power sector has certain advantages in emissions trading, for instance, the emission source is simple and most carbon dioxide is generated from coal combustion, the power enterprises have differences in emission reduction costs, and the sector is barely involved in international competition, therefore the emissions trading is not likely to result in the transfer of sector or emission. However, the power sector also faces certain challenges in implementing emissions trading, a) the fixed power price policy precludes the transmission of increased emission reduction costs to the power price; b) how to design an emissions trading scheme that can not only meet the need for the development of the power sector, but also achieve emission reduction; c) the existing

policy system could also have impacts on the emissions trading in the power sector. All these factors should be elaborated when designing an emissions trading scheme for the power sector.

A considerable challenge faced by the power sector in the participation of emissions trading is how to determine the emission cap and participating entities. The emission target cannot be determined without emission data from enterprises. The sector is lack of unified measurement and calculation standards, therefore, it is difficult to verify and ensure the truthfulness of the data. In addition, it is also very complicated to determine which entity should be covered under ETS, including determining the threshold and criteria for participation and its responsibility. The second challenge is allocation of greenhouse gas emission allowances. It is of vital importance to fairly allocate emission allowances while satisfying reduction requirements of existing legislation and policies; the allocation should not only promote emission reduction by the enterprises, but also provides incentives for participating in carbon trading. The third one is what kind of legislation, policy and guarantee system should be established and improved so as to encourage more enterprises to participate in emission reduction.

2.2 Project Objective

This component will focus on China's power sector on the basis of the research and analysis of the existing emissions trading scheme as well as the lessons and experiences learned in domestic trading schemes of pollutant emission and of power generation. By studying the features of China's power sector as well as relevant regulation and policy systems concerning greenhouse gas emission reduction, key issues on the participation of China's power sector in the national emissions trading will be further explored. As a result, suggestions concerning the method to establish national emissions trading scheme, relevant supporting measures and policies will be proposed so as to provide technical support at industrial level for the establishment of the national emissions trading scheme.

Through study on the experiences of current emissions trading schemes, with the characteristics of China's power sector, the specific objectives are listed as follows:

1. Determination of the types of GHGs and the covered entities of the power sector in emissions trading under the framework of the coverage of China emissions trading scheme;
2. Proposing suggestions for setting principle, idea and method of the total emissions of the power sector in the overall design scheme;
3. Proposing the principle, idea, method and suggestions for emission allowance allocation for China's power sector;
4. Proposing greenhouse gas emissions monitoring, reporting and verification mechanisms in China's power sector;
5. Proposing amendment of key regulations and policies as well as relevant supporting mechanisms for China's power sector participating in the emissions trading.

2.3 Methodologies

The research methodologies mainly include literature study, site visit, interview of experts and discussions with stakeholders.

2.4 Research Activities

2.4.1 Identification of the scope of emissions trading scheme for power sector

- a. Carry out study on the situation and method of selecting entities of the power sector that will be covered by the emissions trading scheme in the existing international emissions trading schemes and analyze its applicability to the power sector in China through on-site study, data collection, communication and discussion, etc.
- b. Carry out study on the organizational structures of China's power sector and analyze the possible options of the entities to be covered by the emissions trading scheme.
- c. Carry out study and analysis on the asset structure, locations, capacity, technology

and unit scales of China's power enterprises.

d. Carry out study on the types of enterprises or installations of the power sector to be included in the emissions trading scheme in pilot areas.

e. Propose the scope of the covered entities in the emissions trading system of China's power sector and confirm the scope after discussions.

2. 4.2 Suggestions on cap setting for the power sector

a. Review the approaches for setting the emission caps for electric power sector in the existing ETS.

b. Statistics and calculation of historical emissions of power enterprises.

c. Analyze the status and prospects of China's electric power enterprises and predict the scenarios of GHG emission reduction by China's power sector.

d. Provide suggestions for the principles, ideas and methods for setting emissions cap of the power sector in the overall design of China emissions trading scheme.

2.4.3 Proposing allocation plan of allowance for power sector

a. Research on allocation mode of the electric power emission allowance in international emissions trading schemes.

b. Research on allocation mode for the electric power sector in each pilot of China's carbon emissions trading.

c. Analyze historical data and intensity level of emissions of China's power enterprises.

d. Propose the principle, idea, method and suggestions for allocation plan of emission allowance for power sector.

e. Stakeholder discussion.

2.4.4 Proposing scheme for the monitoring, reporting and verification mechanisms of emissions of power sector

- a. Survey on emissions circulation and operation mode in the power sector.
- b. Research on monitoring, reporting and verification mechanisms of emissions of international power sector.
- c. Determination of the basic theoretical scheme for monitoring, reporting and verification of greenhouse gas for China's power sector.
- d. Design the monitoring, reporting and verification mechanisms of emissions of China's power sector.
- e. Apply the monitoring, reporting and verification method in typical electric power enterprises.

2.4.5 Suggestions on the guarantee system for electric power sector participating in emissions trading scheme.

- a. Investigate regulations and policies of electric power sector in the international emissions trading scheme, especially the preparation and implementation of the pricing and dispatching mechanisms.
- b. Research on the pricing and dispatching mechanisms of China's electric power sector and analyze the impacts on China's electric power sector participating in the emissions trading scheme.
- c. Research and put forward regulations and policies that require amendments for China's electric power sector participating in the emissions trading schemes.

2.5 Output

1. *Research Report on the Coverage of the Emissions trading scheme of the Power sector*
2. *Draft Proposal on the Total Emissions Target Setting Scheme for the power sector*
3. *Emissions Allowance Allocation Scheme for the Power sector*
4. *Proposal on greenhouse gas monitoring, reporting and verification mechanisms in*

the power sector

5. *Suggestions on the guarantee system of China's power sector participating in the emissions trading*

3. Design of Key issues of China's Power Sector Participating in China ETS

3.1 Scope for the Power Sector

3.1.1 Background

The Scope of the emissions trading scheme mainly concern two issues, i.e. types of regulated GHGs and covered entities.

Types of Regulated GHGs:

The greenhouse gases emitted from the power sector mainly include CO₂, CH₄, N₂O. However, in many existing international emissions trading schemes, only CO₂ is taken into account at the initial stage, and other types of greenhouse gases are included at a later stage after the system has been further developed and improved. For instance, only CO₂ has been covered at the first and second stages of the EU Emissions Trading System. On one hand, this is due to the fact that the monitoring, reporting and verification system regarding CO₂ emission is more developed. On the other hand, it is because the other five types of greenhouse gases account for less than 20% of the EU total greenhouse gas emissions. From 2013, EU will include nitrous oxide (N₂O) generated in the production of nitric acid, oxalic acid and glyoxylic acid and perfluorocarbon (PFCs) generated from the electrolytic aluminum industry in the Emissions Trading System.

The greenhouse gases included in the emissions trading scheme of the power sector should be selected from the greenhouse gases covered by China emissions trading scheme, while various factors related to greenhouse gases including existing statistical system, cost verification, data reliability and the potential of emission reduction of the

power sector should be taken into account. According to the actual situation of the power sector, only CO₂ is recommended as regulated GHG in the emissions trading of the power sector.

Covered Entities:

There are many approaches to classify China's power enterprises. For instance, according to the types of energy used for electricity generation, there are coal power plants, gas power plants, oil power plants, hydroelectric power plants, nuclear power plants, wind power plants, biomass energy power plants, etc.; According to the nature of assets, these enterprises can be divided into state-owned and state-holding enterprises, collective-holding enterprises, private-holding enterprises, Hong Kong, Macao and Taiwan-holding enterprises, foreign-holding enterprises, etc.; According to the capacity of generator units, there are below 6 MW unit, 6-100 MW unit, 100 MW unit, 200 MW unit, 300 MW unit, 600 MW unit and 1000 MW unit; According to the product types, there are power only unit and combined heat and power generation unit . To establish the emissions trading scheme, it is necessary to determine the smallest units of which emissions is to be regulated,, namely to determine whether the covered entities are enterprises or installations. Furthermore, it is necessary to determine the capacity range and types of the covered entities. If enterprises are selected as covered entities, it would be easier to supervise and manage because the enterprise itself is a legal person. Since emission allowances can be transferred internally within an enterprise, it needs further analysis whether to select the power generation groups or individual power plants as the covered entities. If installations are selected as the covered entities, the advantage is that the heavy cost burden caused by the management of a large number of small equipment contributing little to emission reduction could be avoided, but enterprises may lose its flexible control over allowances.

It is relatively common to take installations as covered entities in many existing emissions trading schemes. In the EU ETS, emissions from generator sets of which the heat input capacity is greater than 20 MW were covered, and EU ETS only allocates

emissions allowances to thermal power units but not to renewable energy power units and nuclear power units. By learning the successful experiences of other emissions trading schemes, China should comprehensively consider the design of the emissions trading scheme of its power sector in combination with the specific situation of China's electric power enterprises, such as the present emission level and expected emission level of enterprises/installations, data availability, quality, cost and benefit, handling of registered CDM projects, enterprise/installations covered at the early stage or to be covered gradually.

3.1.2 Objective

The objective of this study is to determine the types of GHGs and the covered entities of the power sector in emissions trading under the framework of the coverage of China emissions trading scheme, through study on how to determine the covered entities of the power sector in existing international emissions trading schemes, and taking into account the characteristics of the power sector in China.

3.1.3 Main contents and activities

(1) Carry out study on the situation and method of selecting entities of the power sector that will be covered by the emissions trading scheme in the existing international emissions trading systems and analyze its applicability to the power sector in China through on-site study, data collection, communication and discussion, etc.

(2) Carry out study on the organizational structures of China's power sector and analyze the possible options of the entities to be covered by the emissions trading scheme.

(3) Carry out study and analysis on the asset structure, locations, capacity, technology and unit scales of China's power enterprises.

(4) Carry out study on the types of enterprises or installations of the power sector to be included in the emissions trading scheme in pilot areas.

(5) Propose the scope of the covered entities in the emissions trading scheme of China's power sector and confirm the scope after discussions.

3.1.4 Expected output

Research Report on the Scope of the Emissions Trading Scheme of the Power sector

3.2 Cap Setting for the Power Sector

3.2.1 Key issues

Almost all existing international emissions trading schemes, either the EU ETS or the US Regional Greenhouse Gas Initiative set the emission cap for the areas and sectors covered by the emissions trading scheme. For China's power sector, there are certain difficulties to set up an absolute unchangeable emission cap in the next few years because of the actual situation of China's economic and social development. Different from developed countries, China is at the stage of rapid economic development, during which power consumption will go up necessarily. Although the scale of China's power grid ranks first in the world at present, the power installed capacity ranks second for 16 consecutive years, which has effectively eased the contradiction in power supply shortage, the national power supply and demand situation as a whole is still relatively tight and structural power shortage still occurs in some local regions. Therefore, the major basis for China's power sector is to guarantee power supply and the primary task is to ensure its development at the crucial stage of China's fast industrialization and urbanization. Under this situation, the total emissions from China's power sector will remain its rising trend in a certain period of time. Therefore, one of the tough issues for the design of the emissions trading scheme is to set up the total emissions of the power sector that are suitable for the situation of China.

The ultimate goal to set the emission cap is to control carbon dioxide emission. As far as the power sector is concerned, the formulation of a reasonable total emission target should first take into account how to ease the contradiction between the increase in

gross power supply and the requirement of total emission reduction shall be considered first, meanwhile the difference of existing units and new units should not be ignored. It should not only encourage the reduction in GHG emissions from the power sector, but also not constrain the development of the power sector. For instance, one of the reasons why no effective trading of the sulfur dioxide emissions trading of the power sector happened in the pilot phase is that the current growth of the power sector is to meet the basic need of its economic development. That all power companies are making efforts to increase installed capacity is a basic business judgment, and it is consistent with the basic rationality of the enterprises to reserve the sulfur dioxide emission allowances generated from emission reduction for newly increased capacity. The lack of transactions of the SO₂ emissions trading scheme is in part due to the fact that the participants of the emissions trading scheme are all power companies, which share the same approaches to sulfur dioxide by reserving the allowances to cover increased capacity.

At present, the target for total carbon dioxide emission from the power sector and its intensity target are not clear, however, for pollutant emissions control, total annual emission limit of sulfur dioxide and nitric oxides from power plants have been determined by the central government. The allocation principle, method and experience in this regard could provide reference for setting carbon dioxide emission cap for the power sector.

The main considerations in setting emissions cap for the power sector include electric power development planning, its influence on national economy, economic bearing capacity, power terminal demand, electric power technology, historical data concerning carbon dioxide emission of the power sector and forecasting of emission trend in the future. Meanwhile, China's power sector has its special features, namely trading cost can't be shifted to electricity price, which is also a main factor that should be considered in setting emission cap for the power sector. Experiences from California ETS are a good reference since the retail tariff is also regulated there.

One way to set emissions cap for the power sector is the “top-down” approach, namely to identify the emission cap of the power sector according to the national total emissions cap, the power emission reduction contribution and the level of electric power development. The other way is the “bottom-up” approach that is to identify the total emissions of the entire power sector based on the prediction of emissions accumulated from the entities covered by the emissions trading scheme.

It is pointed out in *The Twelfth Five-Year Plan of the People's Republic of China* that, in 2015, the national energy consumption per unit of GDP will be reduced by 16% over that in 2010 and the national CO₂ emission per unit of GDP will be reduced by 17% over that in 2010. In addition, the explicit requirements are proposed on such parameters as coal consumption of power supply and power consumption rate of the power sector in 2015 in *The Twelfth Five-Year Plan on Energy Conservation and Emission Reduction* approved by State Council. These requirements on indexes provide a basis for setting the emission cap in the “top-down” approach. Meanwhile, at the enterprise level, each power group sets its own group-level targets for the coal consumption rate of power supply and pollutants discharge control, and these targets are allocated to each subsidiary or even each generator unit. Such measure also provides a basis for adopting the “bottom-up” manner to set the emission cap.

In short, the formulation of the emission cap of the power sector is not only the key issue to effectively implement the emissions trading scheme in the power sector, but also a difficult issue to design. This needs to be studied profoundly.

3.2.2 Objective

The objective of this study is to provide suggestions for setting principle, idea and method of the total emissions of the power sector in the overall design scheme (Building Block 4 of the research subject) of China emissions trading scheme, through studying the methodologies for setting emissions cap for the power sector in the existing international emissions trading systems and in combination with the

characteristics of China's power sector.

3.2.3 Main contents and activities

(1) Review the approaches for setting the emission caps for electric power sector in the existing ETS. The main activities include:

1) Carry out study on the development, technical level, status and trend of carbon dioxide emission of the power sector as well as ideas and method of cap setting and specific value of greenhouse gas emission target in foreign emissions trading schemes, such as EU ETS, RGGI and AB32, and analyze their applicability in cap setting for the emissions of the power sector in China through field visit, data collection, communication and discussion, etc.

2) Learn about the design methodology, experience, lessons and other aspects of emissions cap setting for the power sector in China's emissions trading pilots through literature study, expert interview and other ways.

(2) Statistics and calculation of historical emissions of power enterprises. The main activities include as follows:

1) Design data collection table and carry out study on enterprises to get the basic data of the enterprises.

2) Evaluate, select and confirm the calculation method of historical emissions of the enterprises.

(3) Analyze the status and prospects of China's power enterprises and predict the scenarios of GHG emission reduction by China's power sector. The main activities include as follows:

1) Analyze development status, development level and technical application of China's power sector in combination with enterprise study and compare it with international status;

2) Predict China's power demand, installed capacity and electricity generation planning (including planning of the non-fossil energy installed capacity such as hydropower, nuclear energy, wind energy and solar energy and newly installed capacity demand),

low carbon technology development, application trend, emission reduction potential and cost by combining with enterprise study.

3) Predict the GHG emission reduction scenarios, such as, BAU scenarios, moderate emission reduction scenarios and deep emission reduction scenarios.

(4) Provide suggestions for the principles, ideas and methods for setting emissions cap of the power sector in the overall design of China emissions trading scheme according to the research contents above. The main activities include as follows:

1) Compare the applicability of methodologies for setting the emissions cap for China's power sector and analyze the existing obstacles and difficulties.

2) Propose preliminary thoughts and selection of the base year for setting emissions cap for the power sector by learning international experience and combining with electric power planning.

3.2.4 Expected output

Draft Proposal for setting the Emissions Cap for the power sector

3.3 Allowance Allocation of the Power Sector

3.3.1 Background

China's power sector has many features such as low electricity consumption intensity and emissions intensity, deficient degree of marketization in power transaction, inability to put the rising generating cost in the power price, and so on. Therefore it should be linked to power structure in considering allocating emission allowance. While vigorously promoting the development of clean energy, we should fully consider the coal-dominant energy structure so as to show the objectivity, equilibrium and fairness of emissions trading. With the definition of emissions cap as the prerequisite, the rise in electricity generation should be considered in allocating allowance to power plants and setting emission reduction targets, so a static and fixed index is not feasible. At the same time, the power structure adjustment should be taken into account in

allocating emission allowance to the power sector. For example, the amount of electricity that is produced by using clean energy in a power plant can be considered in setting carbon targets. In addition, the issues as for how to allocate allowance to newly-built power plants, power plants to be shut down and the combined heat and power generation plants should be taken into account. China's current demand for power keeps growing fast, and if the allowance to the new power equipment is allocated inappropriately, the carbon scarcity will become too high and carbon liquidity will reduce, which is harmful to the healthy operation of the carbon market.

At present, the historical data method and baseline method are adopted for allowance allocation for the power sector in EU ETS as well as other ETS and whether the related allocation methods are suitable for China's power sector needs to be studied further.

3.3.2 Objective

Through the in-depth research on the power sector emission allowance allocation scheme in existing foreign emissions trading schemes and in combination with the characteristics of China's power sector, the principle, idea, method and suggestions for emission allowance allocation for China's power sector are to be suggested.

3.3.3 Main contents and activities

(1) Research on allocation mechanism of the electric power emission allowance in international emissions trading schemes. The main activities include:

1) Carry out study on allocation mechanism of the electric power emission allowance in countries where the emissions trading scheme is implemented through on-site study, data collection, communication, discussion and other ways.

2) Learn about the actual impacts, fairness and the influence on emission reduction cost of different allocation modes, fairness and the influence on emission reduction cost and analyze its enlightenment on the emission allowance allocation of China's power sector.

(2) Research on allocation mode of the electric power emission allowance in each pilot

of China's emissions trading.

1) Learn about preliminary allocation, allocation methodology and rules design of the electric power emission allowance in each pilot.

2) Summarize experience and lessons of the power sector in each pilot during the implementation of the system, and analyze its enlightenment on emission allowance allocation of China's power sector.

(3) Analyze historical data and intensity level of emissions of China's power enterprises.

The main activities include:

1) Carry out study on historical data and intensity level of emissions generated by the covered electric power enterprises.

2) Learn about the cost of emission reduction of the covered electric power enterprises.

(4) Propose the principles, ideas, methods and suggestions for allocation plan of emission allowance for power sector. The main activities include:

1) Demonstrate the feasibility of allowance allocation methods for China's power sector and analyze the possible obstacles and difficulties.

2) Demonstrate whether allowance allocation is based on enterprises or installations after considering the operability of verification and supervision costs,

3) Put forward emission allowance allocation scheme for the power sector.

4) Evaluate the operability, fairness and impact on emission reduction cost of enterprises and enterprise development in the implementation of the scheme, modify and improve the scheme.

(5) Stakeholder discussion

1) Invite stakeholders, such as power enterprises, regulatory agencies to participate in discussions and further modify and improve the allowance allocation scheme.

3.3.4 Expected output

The Allowance Allocation Scheme for the Power sector

3.4 MRV of GHG Emissions in the Power Sector

3.4.1 Background

The MRV is to monitor whether the emissions data of controlled installations are real and reliable. It is not only the data basis to develop all the emissions trading scheme, but also the basic institutional guarantee to establish the emissions trading.

Currently, China's power sector has a relatively complete statistical system. The accounting of its operation is authorized by the NBS and conducted by China Electricity Council; the scope covers all national power grids and power generation companies. The China Electricity Council organizes all power grids, power generation groups, provincial power associations with industrial statistical functions and relevant units to jointly establish the statistical system of the power sector, and each unit divide the work according to different assignments so as to complete its data report respectively.

As to statistical indicators, the electric power statistics mainly involves the electric power production, investment, environmental protection, education, equipment operation, rural electric power and electric power science & technology. At present, the carbon dioxide emission concerned in the statistical reports is scattered in all relevant reports, including the raw coal consumption, coal equivalent consumption, gross coal consumption rate for power generation, net coal consumption rate for power supply, auxiliary power consumption rate, line loss rate, desulfurizer consumption, etc., which have laid a good foundation for establishing the carbon dioxide emission statistical calculation system and emissions data reporting; however, the statistical data on carbon dioxide emissions is not available currently.

All coal-fired power plants are equipped with the Continuous Emission Monitoring System (CEMS), and are connected to the monitoring information platforms of county-level, municipal, regional & provincial environmental monitoring centers

(stations) and electric power dispatching system. In addition, desulfurization units have been monitored online in Jiangsu, Guizhou, Shandong, Beijing, Tianjin, Hebei and other regions, and connections in other regions are also under progress now. However, the coal-fired power plants haven't monitored carbon dioxide emission specifically.

In short, the carbon dioxide emission measurement, reporting and verification system in China's power sector is far from complete in terms of intellectual resources and infrastructures. Meanwhile, we are severely in lack of MRV specialists with relevant skills and practical operation experience.

In respect of carbon dioxide emission measurement in the power sector, the first existing problem is lack of emission accounting standard. Up to now, no relevant standard has been released in the sector, so different companies use different methods to calculate carbon dioxide emission. The second problem is derived from various quality of coal for power generation. With the widened gap between coal supply and demand, the coal supply channels of coal-fired power plants become very complicated with the shortage of power generating coal supply. Multiple types of coal are often combusted together, so the quality of coal varies greatly which hinders the accurate and consistent calculation of carbon dioxide. The third problem is that the continuous monitoring system in the power sector is too expensive thus only feasible to larger emission sources. The fourth problem is that some power enterprises haven't been aware of the importance of the statistics and is not able to effectively monitor energy conservation and emission reduction data. At present, the data of energy conservation and emission reduction mainly originates from self-declaration of power companies with its summary and analysis performed by relevant departments, which influences promptness and accuracy of statistical data.

In terms of greenhouse gas reporting in the power sector, relevant statistical data is submitted monthly, quarterly or annually to environmental protection departments, electric power monitoring authorities, local technical supervision & management units

(e.g. China Electric Power Research Institute), Bureau of Commodity Price, senior authorities, industrial statistical departments and so on with indicators covering power production, fuel consumption and pollutant emission. Nevertheless, there is no specified greenhouse gas reporting up to now and relevant provisions haven't been stipulated yet.

In terms of greenhouse gas emission verification in the power sector, China hasn't set up any unified verification system. Prior to the reform of the China's electric power system, the Ministry of Electric Power (later State Power Corporation) was responsible for managing and monitoring electric power energy conservation and emission reduction; after the structural reform, the energy conservation, environmental protection, monitoring and supervision systems disintegrated, but the new systems are not complete. There are many improvements to be made; existing problems include: the weakening of basis of energy conservation and emission reduction, macro-management, delayed technology research, shortage of long-term and unified supervision and management, incomplete institutional mechanism and so on.

Therefore, how to establish a practical, reliable, trustworthy and efficient MRV mechanism tailored to China's power sector become an urgent task.

3.4.2 Objectives

By referring to the international experience of greenhouse gas emission monitoring, reporting and verification mechanisms for power sector, integrating China's specific condition and the nature of our power sector, the program for establishing greenhouse gas monitoring, reporting and verification mechanisms in China's power sector is proposed.

3.4.3 Main contents and activities

(1) Survey on emissions circulation and operation mode in the power sector.

1) Analyze the emission sources in the production process for the power sector

2) Evaluation of the proportion of carbon dioxide emission from different emission sources and determination of the proportion order.

(2) Research on monitoring, reporting and verification mechanisms of emissions of international power sector. The main activities include:

1) Through on-site investigation, data collection, communication, discussion and other methods, investigate greenhouse gas monitoring, reporting and verification mechanisms in power sectors of other countries, and compare & analyze these data;

2) Summarize the international practical experience, analyze and draw any inspiration on establishing greenhouse gas monitoring, reporting and verification mechanisms in China's power sector.

(3) Analyze the electric power production features in China, summarize experience obtained from statistics of energy consumption, monitoring and reporting in the power sector in the "Eleventh Five-Year", and select 1~2 mid-to-large-size enterprises for on-site investigation so as to outline the basic framework of greenhouse gas emission monitoring, reporting and verification systems in the power sector.

1) Study relevant index settings, data quality, management, monitoring, reporting system, assessment and so on by visiting relevant government departments, investigating power enterprises and research institutes.

2) Select 1~2 mid-to-large size electric power enterprises to conduct on-site investigation so as to determine the actual energy statistics and monitoring situation.

3) Analyze the basic conditions and difficulties for greenhouse gas emission monitoring, reporting and verification in China's power sector.

4) Compare and analyze the greenhouse gas calculation methods of international companies in the power sector and statistical energy of China's electric power companies, and come to the conclusion of basic frameworks for greenhouse gas emission monitoring, reporting and verification systems suitable for companies in

China's power sector.

(4) Design greenhouse gas emission monitoring, reporting and verification programs for China's power sector. The main activities include:

1) Propose the calculation and statistical methods of greenhouse gas emission in the power sector, and guarantee the accuracy and operability of these statistical methods through on-site measurement and tolerance comparison of typical units.

2) Investigate the formats, content and framework of greenhouse gas emission reports in the power sector.

3) Prepare the verification programs for greenhouse gas emission in the power sector, including verification qualification, procedure, standard, etc..

(5) Apply the greenhouse gas emission monitoring, reporting and verification programs in pilot enterprises and make rectifications.

3.4.4 Expected outputs

A proposal for establishing greenhouse gas monitoring, reporting and verification mechanisms in the power sector, including measurement methods of greenhouse gas emission, report formats of greenhouse gas emission in the power sector and suggestions on greenhouse gas verification programs for China's electric power companies.

3.5 Suggestions on the Coordination of Pricing and Dispatching Mechanism with ETS in the Power Sector

3.5.1 Background

Clear and specified policies are the foundation to conduct emissions trading. In other words, not only are clear total emission target and reasonable emission allowance allocation necessary, but also relevant management mechanisms are essential to

guarantee the success of the emissions trading.

Currently, the legal and relevant institutional framework to support the power sector and implementation of the emissions trading are not complete. Some new policies are needed and existing legal regulations and policies requires further amendment. For example, the electricity price in China is basically fixed, so the cost of emission reduction can't be shifted into the electricity price, which makes allowance allocation and emissions trading difficult. Another example is that China's electric power dispatching is not determined by the power generation companies, but determined by the following measures: the local governments prepare annual plans in advance so as to determine the number of hours of annual power generation for each power plant; the company can't adjust the amount of electric power generation upon its cost. Hence, the companies which lack of power allowance can't reduce the loss by adjusting power generation amount. There are many regulations and policies related to energy conservation, consumption reduction and pollutant control. The allocation and management methods of emissions trading should be in line with existing regulations and policies, and meanwhile, some of regulations and policies should be further modified and improved so as to guarantee the smooth operation of the emissions trading in the power sector.

3.5.2 Objectives

By referring to the pricing mechanism and dispatching mechanism in the international emissions trading regarding power sector and in combination with China's conditions, the amendment of key regulations and policies required for China's power sector participating in the emissions trading shall be proposed and relevant supporting mechanisms shall be established as well.

3.5.3 Main contents and activities

(1) Investigate regulations and policies of the power sector in the international

emissions trading scheme, especially the preparation and implementation of the pricing and dispatching mechanisms. The main activities include:

1) Through on-site visit, data collection, communication, discussion and other methods, investigate the pricing and dispatching mechanisms of the power sector in the international emissions trading scheme.

2) Study the implementation, management procedures, results and obstacles related to the pricing and dispatching mechanisms.

3) Summarize the international practical experience and analyze the applicability to create the pricing and dispatching mechanisms of the emissions trading for China's power sector.

(2) Research on the pricing and dispatching mechanisms of China's power sector, and analyze the impacts on China's power sector in the emissions trading scheme.

(3) Research and put forward the regulations and policies that require amendments for China's power sector participating in the emissions trading schemes. The main activities include:

1) By integrating the pricing mechanism, dispatching mechanisms and their implementations in the international emissions trading scheme with those of China's power sector, analyze the constraints of relevant policies to the emissions trading in the power sector.

2) The regulations and policies that require amendments for China's power sector participating in the emissions trading shall be preliminarily proposed, relevant supporting mechanisms shall be established as well and invite relevant government departments, institutes and experts to discuss the feasibility of this implemented program.

3) Review feedbacks from experts, analyze existing problems and difficulties of the mechanisms and make adjustments.

3.5.4 Expected outputs

Suggestions on the coordination of pricing and dispatching mechanism with the emissions trading

4. TOR

Objectives and instructions

Objectives	Rationale
Explore to build basic institutional framework of emissions trading scheme applicable to China's electric power sector, propose scientific construction method for emissions trading scheme, as well as supporting measures and policy suggestions, so as to provide technical support on sectoral level for the national emissions trading scheme, as well as technical support for mitigating greenhouse gas emission and reducing the emission reduction cost for the whole society.	Please refer to the main text.

Output

Output	Content	Party Responsible for Ensuring Action	Department for implementation assurance
<ol style="list-style-type: none"> 1. Coverage of emissions trading scheme for power sector 2. Suggestions on cap setting for power sector in emissions trading 3. Allocation plan of allowance for power sector 4. Scheme for the monitoring, reporting and verification mechanisms of emissions of power sector 5. Suggestions on the coordination of pricing and dispatching mechanism with emissions trading in power sector. 	Please refer to the main text.	National Development and Reform Commission is the leading organization. Other government agencies are members of the Steering Committee to provide policy guidance and necessary environment for research institutions.	The NDRC serves as the authority, other related government department as memberships of steering committee, providing policy guidance and necessary environment for the research institutes. The research institutes are expected to include China Electricity Council

			and other research institutes.
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Period

Output	Time needed(days)	Completion time
Coverage of emissions trading scheme for power sector	180	0.5 year
Suggestions on cap setting for power sector in emissions trading	180	0.5 year
Allocation plan of allowance for power sector	540	1.5 year
Scheme for the monitoring, reporting and verification mechanisms of emissions of power sector	360	1 year
Suggestions on the coordination of pricing and dispatching mechanism with emissions trading in power sector.	360	1 year

Financial budget

Activities	Expected cost (in US\$)				
	The 1 st year	The 2 nd year	The 3 rd year	...	Total
(1) Identification of the coverage of emissions trading scheme for power sector a. Carry out study on the situation and method of selecting entities of the power sector that will be covered by the emissions trading scheme in the existing international emissions trading systems and analyze its applicability the power sector in China through the on-site study, data collection, communication and discussion, etc. b. Carry out an study on the organizational structures of the China's power sector and analyze the possible options of entities covered by the emissions trading. c. Carry out study and analysis on the asset structure, locations, capacity, technology and unit scales of China's power enterprises. d. Carry out study on the types of enterprises or installations of the power sector included in the emissions trading scheme in pilot areas. e. Propose the scope of covered entities in the emissions trading of China's power sector and confirm the scope after discussions.					
(2) Suggestions on cap setting for power sector in emissions trading a. Review the approaches for setting the emission caps for electric power sector in the existing ETS.					

<p>b. Statistics and calculation of historical emissions of power enterprises.</p> <p>c. Analyze the status and prospects of China's power enterprises and predict the scenarios of greenhouse gas emission reductions by China's power sector.</p> <p>d. Provide suggestions for the principles, ideas and methods for setting emissions cap of the power sector in the overall design scheme of China emissions trading scheme</p>					
<p>(3) Allocation plan of allowance for power sector</p> <p>a. Research on allocation mechanism of the electric power emission allowance in international emissions trading schemes.</p> <p>b. Research on allocation mechanism of the electric power emission allowance in each pilot of China emissions trading schemes.</p> <p>c. Analyze historical data and intensity level of emissions of China's power enterprises</p> <p>d. Propose the principles, ideas, methods and suggestions for allocation plan of emission allowance of the power sector.</p> <p>e. Stakeholders discussion.</p>					
<p>(4) Scheme for the monitoring, reporting and verification mechanisms of emissions of power sector</p> <p>a. Survey on the carbon circulation and operational mode of the electric power sector .</p> <p>b. Research on the monitoring, reporting and verification mechanisms of emissions of international power sector</p> <p>c. Determination of the basic theoretical scheme for monitoring, reporting and verification of greenhouse gas.</p> <p>d. Design the monitoring, reporting and verification mechanisms of emissions of China's electric power sector</p> <p>e. Apply the monitoring, reporting and verification programs in pilot enterprises and make rectifications.</p>					
<p>(5) Suggestions on the coordination of pricing and dispatching mechanism with emissions trading in power sector.</p> <p>a. Investigate regulations and policies of the power sector in the international emissions trading scheme, especially the preparation and implementation of the pricing and dispatching mechanisms.</p> <p>b. Research on the pricing and dispatching mechanisms of China's power sector and analyze the impacts on China's power sector participating in the emissions trading scheme.</p> <p>c. Research and put forward regulations and policies that require amendments for China's power sector participating in the emissions trading schemes.</p>					
Total	200,000	200,000	100,000		500,000

Capital source	Total (USD)
Government	0
PMR	500,000

Others	0
Total	500,000

Building Block 7: Project Management: Organization, Communication, Consultation and Engagement

National Development and Reform Commission (NDRC), acting as the national authority in charge of climate change policies and the establishment, operation and management of carbon market, will be responsible for the project implementation and management. For this purpose, NDRC will set up a project management office and appoint a project director and a project manager to be responsible for the overall organization, management of the project, the daily operation of the project management office and coordination with other government departments and agencies.

1. Enhance Coordination among Relevant Ministries at the Central Government Level

A Project Steering Committee will be established to provide policy guidance to the implementation of the project. Members of the committee include officials from NDRC, Ministry of Finance (MOF), Ministry of Industry and Information Technology (MIIT) and other relevant ministries. On top of providing policy guidance, the Committee will also be responsible for overseeing the progress of implementation of the project and evaluating project deliverables.

The planning, design, and implementation of carbon market will require the involvement of different ministries and agencies, and coordination among relevant ministries /agencies is necessary. So another important function of the Project Steering Committee is to provide coordination platform for different ministries and agencies to ensure appropriate linkages and information flows and enhance common understanding among different government departments. This would ensure the necessary support from relevant ministries and agencies for the smooth implementation of the project.

2. Strengthen Dialogue with Local Governments and Key Stakeholders

The involvement of local provincial government and stakeholders such as covered key sectors and enterprises are very important. Without the support of local governments, it is very difficult to design and implement a national carbon market. The government of pilot ETS provinces and cities can also provide valuable inputs. Being aware of this situation, the project management office will organize necessary meetings and workshops at appropriate level dependent on the progress of the project. The meetings and workshops will act as a meaningful substantive consultations or information sharing and consensus building between central and local governments and among key stakeholders.

3. Outreach to the General Public

Engaging with general public may sometimes be very important to ensure necessary public support. Necessary activities to promote public understanding and awareness, for example, print and publication will be carried out.

4. Experts Consultation

In the process of development of Chinese ETS, it is necessary to request suggestions and ideas from outside experts. So this project will consult extensively with related international and domestic experts, and organize international workshop for the improvement of Chinese ETS through their experiences and knowledge.

Budget

Activity	Estimated cost (in US\$)			
	Year 1	Year 2	Year 3	Sub-Total
Project Management	80,000	80,000	80,000	240,000

Consultations/ Workshops/ Coordination Communication		70,000	550,000	710,000	1,330,000
Total Budget		150,000	630,000	790,000	1,570,000

Sources of Funding	Total (USD)
National Government	Not counted here. Please refer to the Building Block 8 Total budget for further information.
PMR	1,570,000
Other (if applicable)	0
Grand Total	1,570,000

Building Block 8: Total Budget

The project is expected to be completed within two years, please refer to TORs in parts hereinbefore to see the research description and timetable of various models. The table below provides estimated cost of various researches in all Building Blocks by years.

Budget

Research Description		Estimated cost (in US\$)			
		Year 1	Year 2	Year 3	Sub-Total
Building Block 2: Coverage Identification		300,000			300,000
Building Block 3: Main Technical and Institutional Elements	1. Data	300,000	200,000		500,000
	2. Management System	150,000			150,000
	3. Legal Framework	100,000	50,000		150,000
Building Block 4 Components for the design of China emissions trading scheme	1. Scope	300,000	200,000		500,000
	2. Cap Setting	400,000	300,000		700,000
	3. Allowance Allocation	400,000	300,000		700,000
	4. Monitoring, Reporting and Verification (MRV) System	500,000	500,000	230,000	1,230,000
	5. Registry		100,000	100,000	200,000
	6. Compliance Mechanism		100,000	100,000	200,000
	7. Price Containment Mechanism		100,000	100,000	200,000
	8. Offset Mechanism and Scheme Linking		100,000	100,000	200,000
	9. Market Oversight		100,000	100,000	200,000
	10. Participants and Trading Products	100,000	100,000		200,000
Building Block 5: Key Study on the Participation of Central Government Managed State-owned Enterprises' (SOEs) in China ETS		200,000	200,000	100,000	500,000
Building Block 6: Analysis on Key Issues of China's Power Sector Participating in China ETS		200,000	200,000	100,000	500,000
Building Block 7 Project Management and other related activities	Project coordinators	80,000	80,000	80,000	240,000
	Consultation, workshops, Coordination and Communication	70,000	550,000	710,000	1,330,000
Total		3,100,000	3,180,000	1,720,000	8,000,000

The overall funding requirement

Establishing an emissions trading scheme in China, such a large developing country, is a very complex systematic project, which requires lots of financial support. It is preliminarily estimated more than 100 million USD is needed. Until now about \$66

million has been arranged by China's central and local governments, and \$12 million is supported by other donors, like EU, Norway etc. So we plan to apply for \$8 million from PMR. The specific allocations of some part of funds are shown in the table below. Besides above mentioned, we are planning to implement some bilateral cooperation projects on ETS with Germany, Australia, Japan etc., to get capital and technology supports from those countries.

Funding Source	Total (USD)
National Government	\$66,000,000
Funding for seven pilot ETS in China	\$60,000,000
Establishment the disaster recovery system of China's ETS registry	\$5,000,000
Designing and establishment of the registry for China's voluntary emission reduction transaction	\$1,000,000
PMR	\$8,000,000
Other	\$11,700,000
Capacity building on ETS (from EU)	\$6,700,000
Designing and establishment of the registry for China emissions trading scheme (from Norway through UNDP)	\$2,900,000
Study on the accounting guidelines and reporting format of enterprises' GHG emissions in 6 sectors (from Norway through UNDP)	\$2,100,000
Grand Total	\$85,700,000