



THE ANNUAL REPORT ON FIRST-YEAR OPERATION OF SHENZHEN ETS

Shenzhen Research Center for Urban Development
China Emissions Exchange
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Capacity Building for the Establishment of Emissions Trading Schemes in China

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Preface

Global warming is one of the most serious threats to mankind in the 21st century. According to the latest assessment report published in November 2014 by the Intergovernmental Panel on Climate Change (IPCC), the most authoritative organisation in this field, climate change is no longer a distant threat, but a practical problem to be faced. If this issue cannot be controlled within a very short period of time, human beings will face serious, universal and irreversible disasters, such as food shortages, refugee crises, species extinction and heavy floods.

After thirty years of rapid economic development, China is facing unprecedented pressure in the areas of energy consumption, environment protection, and climate change. As the world's largest developing country with the largest population, China has taken on responsibility in tackling climate change with effective mitigation and adaptation measures. In 2009, the Chinese government pledged to reduce the carbon intensity of GDP in 2020 by 40 to 45 percent compared with the 2005 level. On 29th October 2011, the National Development and Reform Commission (NDRC) published a notice authorizing the implementation of carbon emissions trading pilot programs, in Beijing, Tianjin, Shanghai, Chongqing, Guangdong, Hubei and Shenzhen. On 1st December the same year, the State Council published its Plan to Control Greenhouse Gas Emissions for the 12th Five-Year Plan, and required the establishment of an emissions trading market.

Shenzhen has played a leading role in China's economic reform and opening up. In the context of further deepening reforms, Shenzhen is actively seeking to take a leading role in the development of an 'ecological civilization', and also puts a great deal of emphasis on the establishment of its emissions trading pilot scheme. Drawing on the EU experience and analysis of local circumstances, pioneers of the Shenzhen carbon market scientifically designed the emissions trading scheme, and actively promoted its development. Through a joint efforts, on 18th June 2013 Shenzhen officially launched its ETS, the first among the seven pilots, once again revealing its innovative edge to both the international and domestic communities.

As this research began, the Shenzhen carbon market had operated for over one year, and experienced a full compliance period. Given the emission reductions achieved, continued economic growth, as well as market performance, the design and operation of the Shenzhen ETS is so far successful. However, the Shenzhen carbon market still has great potential to improve and develop. This project aims to summarise the past one-year operational experience of the Shenzhen carbon market, to identify deficiencies and gaps, and to explore strategies and measures to improve the market. Thus, it provides important analysis and suggestions to enhance performance of the Shenzhen carbon market.

The report will review and draw conclusions about the Shenzhen carbon market's first year performance from the following perspectives: Chapter 1 will elaborate the key components of the Shenzhen ETS, and compare Shenzhen's ETS with other ETSs; Chapter 2 will introduce the Shenzhen carbon market's operational performance, including compliance results, enterprise growth, and trading performance. Chapter 3 will sum up the experience of the first year of operation of the Shenzhen ETS. Chapter 4 will provide policy recommendations on the improvement of the Shenzhen ETS. The report finally provides five case studies of typical regulated companies after in-depth research and highlights the best practice of some companies as well as the passive response of other companies, for the sake of providing a reference for other regulated companies.

Executive Summary

The Shenzhen carbon market started its preparation phase in 2011, and became the first carbon market among the seven pilots to launch on 18th June, 2013. By mid-2014, the Shenzhen carbon market had operated for over one year and had completed its first compliance period. During its first compliance period, the Shenzhen carbon market established several records within China's carbon market. With an open and innovative attitude providing guidance for the development of China's carbon market, Shenzhen has won widespread praise. The reviewing, analysing, and improving of Shenzhen's carbon market has been widely anticipated.

1. The unique context of the Shenzhen ETS

1.1 The first city-wide ETS in China

Shenzhen is the first and only city-wide ETS, even among the other pilots, as Beijing, Shanghai, Tianjin and Chongqing are all municipalities directly under the central government. This gives them an equal status to provinces. Compared to the other pilots, the size of the jurisdictional area, population, the economic and industrial structure, as well as the total emissions, brings greater challenges to the design of ETS.

1.2 The dual emissions reduction targets

Shenzhen is at the latter stage of industrialisation and urbanisation, and its energy consumption and total GHG emissions will continue to increase for the foreseeable future. Thus, it is unrealistic to implement a single absolute cap on carbon emissions. Therefore, Shenzhen designed dual emissions reduction targets with an absolute cap for regulated companies collectively and a relative emission reduction target or an adjustable cap for each individual regulated company.

1.3 Alarm at over-supply of allowances in European carbon market

The EU ETS is recognised as the largest and most successful emissions trading scheme in the world at present. Despite the reputation, the EU ETS has still faced systemic risk in that over-supply cannot be regulated and thus leads to a continuous and significant decline in prices. How to avoid or eliminate high volatility of a carbon price caused by economic fluctuation is a key question for Shenzhen ETS designers.

2. Shenzhen features innovative ETS design

2.1 Strong legal basis created for ETS

Shenzhen takes full advantage of its legislative authority as a Special Economic Zone to enact laws and announced a series of regulations and rules, providing a solid legal foundation for the ETS. In October 2012, the Standing Committee of the Shenzhen People's Congress passed the Provisions of Shenzhen Special Economic Zone on GHG emissions Management (hereinafter referred as "the Provisions"), which is China's first local law specifically on GHG emissions management. It was voted as one of nine highlights of global climate change legislation by the Global Legislators Organisation (GLOBE). In March 2014, the Shenzhen Municipal Government published the Provisional Regulations of the Shenzhen Emissions Trading Pilot Scheme (hereinafter referred as "the Regulation"), which stands out amongst the administrative measures of other pilots due to its length and depth of content.

2.2 Dual control on absolute GHG emissions and carbon intensity

Shenzhen's industrial structure led to the Shenzhen ETS controlling for both absolute GHG emissions and carbon intensity. On one hand, Shenzhen sets an absolute cap according to the economic development of regulated companies. On the other hand, Shenzhen sets a carbon intensity target for each sector and regulated companies according to the historical carbon intensity of each regulated company and sector. It also adjusts the allowances for each regulated company according to its actual production. Meanwhile, Shenzhen does not allow the amount of free allowances to surpass the amount of allowances deducted from regulated companies during the post-adjustment, thus guaranteeing that the absolute cap would not be exceeded by the post-adjustment. The dual control meets the requirement of carbon trading for an 'absolute cap' as well as adapting to the need for continuous development of regulated companies.

2.3 Relatively sophisticated market adjustment mechanism

In order to stabilise the carbon price and to encourage regulated companies to further emissions reductions, Shenzhen boldly created relative sophisticated market adjustment mechanisms, including selling allowances at a fixed price and an allowance buy-back mechanism. These two mechanisms, on the one hand emphasise regulating the market in a moderate way to avoid a strong impact on the carbon market; on the other hand, it sets constraints on market regulation, such as the intensity, frequency, and object of control, to avoid market failure from excessive government intervention.

2.4 Legal ground for carbon financial innovation

Drawing on experience of the development of international carbon markets, the Shenzhen ETS has created room for carbon market innovation. The Provisions encourage institutions and individuals to participate in carbon trading, and the Regulation clearly stipulates that regulated companies can gain profits from allowance allocation through transfer, pledge or other legal means, providing the legal basis for allowance capitalization and carbon finance innovation. At present, the Shenzhen carbon market has developed carbon financial products and services such as carbon pledges, carbon bonds, carbon funds, and the custody of allowance for the spot market. These products/services help regulated companies to obtain capital materialization of allowances, and provide diversified financing channels for regulated companies, actively realizing an economic value of allowances as a financial asset.

3. Shenzhen ETS achieves satisfactory outcomes

3.1 Strict enforcement of the ETS law

Shenzhen has strictly enforced the ETS law during the compliance period, keeping the compliance deadline unchanged and making full use of media channels to publish announcements related to penalty rules, thus dismissing the hesitant and reluctant attitudes of some regulated companies, effectively guaranteeing a high compliance rate for the Shenzhen ETS. Therefore, the Shenzhen ETS pilot became one of only two pilots that did not defer its compliance deadline.

3.2 Compliance result beyond expectations

As of 1st July 2014, 631 out of 635 regulated companies in the Shenzhen ETS successfully surrendered allowances and fulfilled their compliance obligations on time. This number represents the highest level among the seven pilot ETSs. The compliance rate of companies reached 99.4% while the compliance rate of allowances reached 99.7%.

Shenzhen's compliance result is very close or equal to that of international carbon markets, thus going beyond expectations.

3.3 Outstanding emissions reduction achievements

The Shenzhen ETS's first year of operation successfully achieved the reduction targets in both carbon intensity and carbon emissions. Compared with the base-year (2010), in 2013 the total amount of GHG emissions of the 635 regulated companies decreased by 3.75 million tons, a rate of 11.5%. Among these 635 regulated companies, 621 manufacturing companies produced total carbon emissions of 0.8 million tons, a decline of 5.2%. Meanwhile, the carbon intensity (CO₂ per unit of industrial added value) of 621 manufacturing companies declined by 33.2% compared with 2010. The achievement exceeds the carbon intensity goal set in Shenzhen's 12th Twelfth Five-year Plan which is 21%.

3.4 Impressive economic growth of regulated companies

In 2013, the total electricity output of the 8 covered power plants was 20 billion kilowatt hours, the amount of water generated by 4 water supply plants was 1 billion cubic meters, natural gas produced by a single covered company was approximately 6 million tons, and the total amount of glass exceeded 0.3 million tons. At the same time, the industrial added value of 621 Shenzhen manufacturing companies was about CNY351.8 billion, CNY105.1 billion more than 2010, an increase of 42.2%. It is obvious that the regulated companies successfully achieved the emissions reduction target together with great economic growth.

3.5 Preliminarily functioning of the carbon market

Shenzhen's carbon market is a leader in terms of liquidity. Firstly, not only is the Shenzhen carbon market open to domestic individual investors and institutions, but it is also opens to overseas investors, increasing the diversity of market participants. Secondly, in the first compliance year, the Shenzhen carbon market accounted for 2.5% of the allowances of all seven pilots and accomplishes 12.6% of overall trading volume and 22.9% of the turnover. Shenzhen's carbon market is also the first ETS that broke CNY100 million trading value in China. Thirdly, the ratio of the carbon market's trading volume to turnover is 5.24%, higher than other ETS pilots. Fourthly, the Shenzhen carbon market has a large number of effective trading days. To the end of the compliance period, the Shenzhen carbon market had 256 trading days, 209 of which were effective trading days. Thus, it can be seen that the market function of the Shenzhen ETS is evident via forming a relatively complete price curve, allowing preliminary and effective information for decision-making by market participants.

3.6 Building momentum for development of China's national market

Research for the development of China's national carbon market has begun. The Shenzhen ETS can bring the following four lessons to the development of a nationwide ETS. The first is to strengthen the top-level design of nationwide carbon trading, formulating national frameworks to curb greenhouse gas emissions, as well as promoting the progress of carbon trading legislation, providing a clear direction for the development of China's national carbon market. The second is to enhance the details of ETS design structure. This is an important element which will distinguish the nationwide carbon market from the pilots. The national government shall issue related guidelines and solutions to technical problems. The third is to promote an open market, that is, closed or false markets are not allowed. The last is to strengthen the full range of capacity building, from policy makers to regulated companies, verification bodies, as well as to market investors and the trading platform.

4. The Shenzhen ETS faces common problems

4.1 Further improvement of stability and transparency of policies

Due to limited time and a heavy workload, the formulation of relevant rules has lagged behind the issuance of policies during the pilot period. While Shenzhen is at the forefront in terms of formulating and promulgating major ETS regulatory rules, such as the Provisions and the Regulation, the issuance of detailed regulatory rules relevant to the Regulation has been delayed. Meanwhile, some regulated companies find it difficult to understand the theory and application of the allowance allocation method, as well as the large variation in some verification methodologies and requirements, thus bringing unnecessary anxiety to regulated companies in managing their carbon assets and participating in trading.

4.2 Required improvement to the carbon market

Compared to other mature capital markets, such as the stock market, the Shenzhen carbon market did not function as well as it should have in the following four areas. Firstly, there is significantly low liquidity in the carbon market in terms of breadth, depth, flexibility and speed of transactions. Secondly, the carbon price cannot guide the investment decisions and emission reduction decisions of regulated companies. The liquidity is not enough to create a real price signal and does not reflect the real cost of emission reduction, meaning that emissions are not reduced in an optimal way. Thirdly, regulated companies cannot find good instruments to hedge the price risk. There is only spot trading in the Shenzhen carbon market, and regulated companies, therefore, lack financial instruments to manage their carbon market position and hedge the price risks. Last but not least, the trading model is less efficient. The non-continuous trading model cannot show the demand of the real-time market, but instead distorts the price forming mechanism. Also, since the time for delivery is four days longer than the stock market, carbon market participants show low willingness to trade. Therefore, the market function of the ETS has not completely come into play yet, and there is still a long way to go to enhance the functioning of the market.

4.3 Greater efforts on carbon information disclosure

The timely and adequate disclosure of information is a prerequisite to improving the confidence of market participants and to promoting a well-functioning carbon market. Presently, Shenzhen has not established a sufficient information disclosure mechanism, which can be seen from the following three aspects: first, Shenzhen has not yet set specific rules on carbon market information disclosure. Secondly, the content of information disclosed is not complete. There is a large gap between market demand and the actual amount of information disclosed. Thirdly, the information is hard to collect because the methods to disclose information are dispersed.

4.4 Urgent requirement of capacity building for regulated companies

At the early stage of the carbon market, capacity building for all participants is urgent, especially for regulated companies. Though Shenzhen invested a large amount of resources into the capacity building of regulated companies after the launch of the carbon market, regulated companies have revealed that they still lack the professional knowledge to make the right determination on carbon asset management and carbon trading. The fact that some high-level managers and boards of directors did not have sufficient knowledge of the ETS has become a significant barrier for regulated companies to reduce emissions, implement MRV, and fulfil their compliance obligations.

5. The Shenzhen ETS needs refinement

5.1 Strengthen policy development

Shenzhen should establish and issue supplementary rules for the Regulation, including rules for allowance adjustment, allowance auction, the price containment reserve, allowance buy-back mechanism, carbon market stabilising funds, as well as the offsetting credits mechanism. Moreover, Shenzhen should improve rules for the Registry and GHG emissions Information Management System, and specify management for information infrastructure. Meanwhile, Shenzhen should develop rules for calculation of industrial added value and verification and strengthen the foundations of MRV. Last but not least, Shenzhen should explore the development of information disclosure mechanisms.

5.2 Emphasise multi-party/multi-channel communications

To underline multi-party/multi-channel communications the competent authority should organise inter-departmental joint conferences at least twice a year. The participants should come from municipal government departments and district-level departments. The competent authority also needs to establish effective communication channels among Shenzhen carbon market stakeholders. For example, borrowing from EU ETS best practice, the competent authority could organise seminars and workshops for stakeholders, including industrial associations, regulated companies and market investors. Shenzhen should also support self-regulating industry organisations, such as Shenzhen Carbon Trading Association, to increase communication channels.

5.3 Enhance market functioning

To enhance the market's function of efficiently allocating carbon resources and lowering the compliance cost of the regulated companies, the competent authority should work with relevant government departments to actively communicate with the national authority and financial regulators in order to establish the legal status of carbon trading platform. This will allow the trading platform to break through the restrictions on existing transaction models, and thus explore more effective market-based price forming mechanisms. Furthermore, Shenzhen should advise national financial regulators to approve the trading of carbon derivatives on the carbon trading platform and create a strict regulatory regime to increase market transparency, avoid market manipulation and guarantee market effectiveness.

5.4 Development of a regional market

The scope of the Shenzhen carbon market is too small for its further development and maturation. In order to further enhance and improve the Shenzhen carbon market, expanding its scope is the only way forward. In concert with the policies on national carbon market development, Shenzhen should actively communicate and closely collaborate with other provinces and cities so as to establish a regional market and explore ways to establish a nationwide carbon market.

5.5 Explore information disclosure

The level of maturation of a carbon market depends on the level of richness and transparency of information disclosed. Competent authorities of Shenzhen should explore an information disclosure mechanism to satisfy the requirements of the carbon market, including who, when, what, where, how and how frequently to disclose.

5.6 Transition to a national carbon market

With the acceleration of the development of a national carbon market, the relationship between pilots and the national carbon market, and the transition process, have become key issues for the pilot carbon market. Competent authorities should conduct in depth research on the linkage between the Shenzhen carbon market and the national carbon market, bring forward strategies and measures to enhance the influence and projection of the Shenzhen market, and enhance market confidence both in the Shenzhen carbon market and the national carbon market.

CHAPTER ONE: EXPLANATION AND COMPARISON OF SHENZHEN ETS

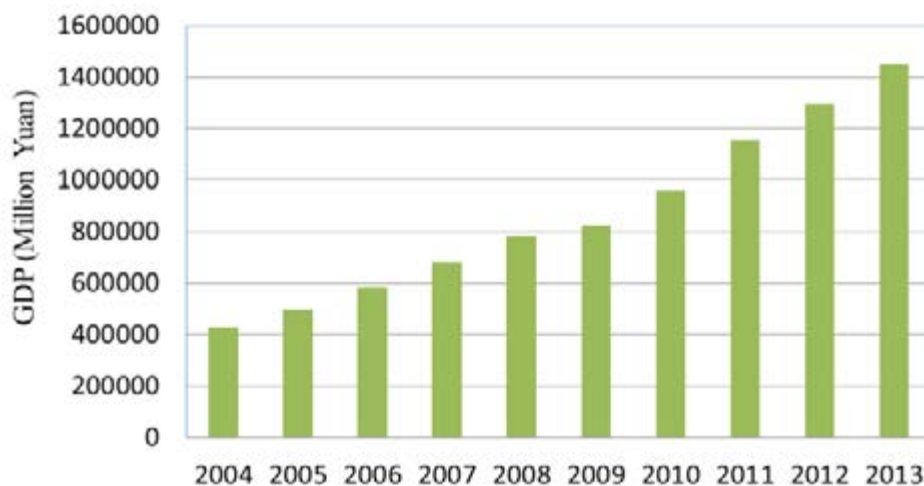
Guided by a spirit of openness and innovation, Shenzhen has developed a carbon emissions trading scheme with Shenzhen characteristics. The scheme draws on the experiences of the international carbon market, while adapting to China's national conditions and considering Shenzhen's particular economic and industrial structure and energy consumption.

1.1 Background of the Shenzhen ETS

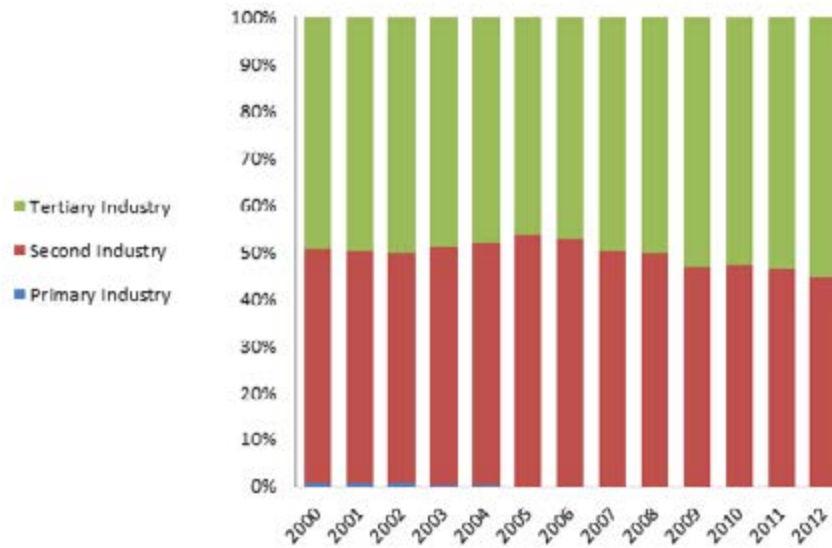
Shenzhen's socio-economic development, energy saving goals and emissions structure were all fully taken into consideration when setting up the emissions cap.

1.1.1 Social and economic development

With economic development and upgrading of the industrial structure, high-tech industries, advanced manufacturing and high-end services have become the mainstay of the modern industrial system in Shenzhen. As can be seen from Graph 1.1, GDP has increased steadily. The proportion of the three industrial sectors has changed from 0.2:52.4:47.4 in 2005 to 0.1:47.2:52.7 in 2010 (Graph 1.2). The modern service industry accounted for 68% of tertiary industry. 70% of above-scale industrial added value was from the manufacturing industry.



Graph 1.1 Shenzhen GDP (2004 - 2013)

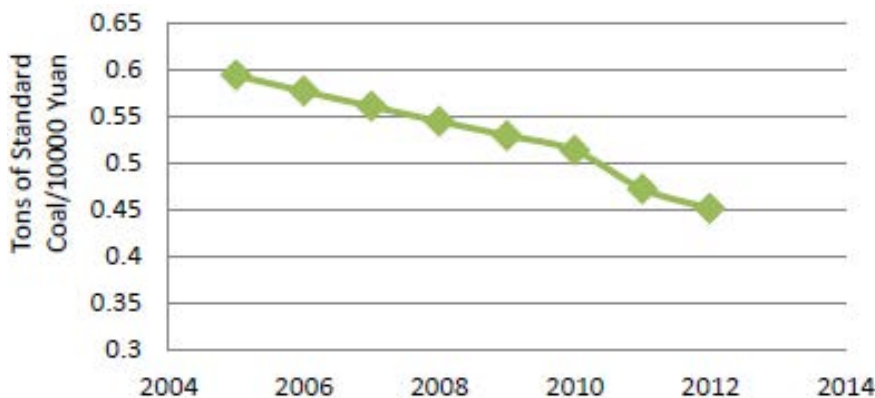


Graph 1.2 Industrial structure of Shenzhen

Shenzhen is in the latter stages of urbanization and industrialization. Shenzhen will see an increase in energy consumption and total GHG emissions in the foreseeable future as a result of urbanization, population growth and economic development. It is expected that total GHG emissions will not reach a peak prior to the inflection point where energy consumption reaches its highest level. Therefore, Shenzhen has applied a relative total emissions control target in order to adapt to rapid economic growth and continuous improvement in living standards. During the years 2005-2010, Shenzhen carbon emissions increased by only 26%, meaning that the emissions growth rate in Shenzhen has slowed down, providing the conditions for setting an absolute total GHG emissions control target.

1.1.2 Total GHG emissions and emission structure

With the development of both the economy and society, living standards are improving, leading to an increase in the total amount of GHG emissions. At the same time, the growth rate of GHG emissions in Shenzhen has slowed and emissions per unit of GDP has been going down consistently as a result of efforts to tackle climate change, which can be seen from Graph 1.3.



Graph 1.3 Energy consumption per CNY10,000 of GDP in Shenzhen

The total amount of GHG emissions increased by 26.3% from 60 million tons in 2005 to 80 million tons in 2010, with an annual growth rate of 4.79%. The growth of direct emissions was smaller, with an average growth rate of only 1.26%, while indirect emissions (imported power) doubled, with an average growth rate of 16.05%.

The quality of economic development has improved, with a continuous decrease in carbon intensity, which dropped by 34.7% from 2005 to 2010, with an average annual decline of 8.17%. Meanwhile, the level of GHG emissions per capita remained stable at around 6.5 tons per capita.

Regarding emission sources, the combustion of fossil fuels contributes the largest amount of GHG emissions, accounting for 92% of direct emissions. The rate kept constant between 2005 and 2010, but GHG emissions showed a small increase (6%) with an average annual growth of 1.16%.

From the perspective of the industrial structure, the emissions from primary and secondary industries decreased, whereas those from tertiary industries increased. The ratio changed from 2.9:51.8:39.9 in 2005 to 0.4:42.1:52.8 in 2010. The changes in GHG emissions of the three industrial sectors are in line with the restructuring of Shenzhen industry.

1.1.3 Energy saving target

The main contributions to GHG emissions in Shenzhen come from the industrial sector, transportation, services and residential living. With rising living standards, the GHG emissions from transportation, services and residential living are expected to grow. Therefore, given the requirements of Shenzhen's carbon intensity target for the 12th Five-Year Plan period, the industrial sector needs to take a heavier burden in energy saving, with a reduction rate more than 21%. Industry in Shenzhen can be divided into two groups: one includes water-supply, electricity generation, and gas generation companies; the other includes manufacturing companies. Research findings show that the emission reduction potential from the former group (water-supply, electricity generation and gas companies) is less than 21%. After careful calculation, the carbon intensity target for manufacturing companies requires a decline of more than 25% in order to achieve the goal for the 12th Five-Year Plan period (21%).

1.2 Elaboration of the Shenzhen ETS

1.2.1 Cap setting

The Shenzhen ETS combines top-down with bottom-up to set an adjustable cap. Top-down refers to forecasting the carbon intensity goal for an industry and then separating the goal to different industrial sectors on the basis of the economic growth rate and the carbon intensity target for the 12th Five-Year Plan period. The Bottom-up approach refers to finding the carbon intensity goal for each regulated company via allowance allocation method by combining its historical emissions with the industrial carbon intensity goal, as well as calculating the pre-allocation allowances of each regulated company on the basis of its three-year (2013-2015) economic growth rate. The cap consists of the amount of pre-allocation allowances, reserved allowances set aside by the government at a fixed proportion, and carbon offsetting allowances. Finally, Shenzhen formulated the absolute emissions and allowances cap that must be met by the regulated companies combined, as well as the carbon intensity target that must be complied with by each individual regulated company.

When the external economy disturbs the market, adjustment is required. Shenzhen will keep the declining carbon intensity target and conduct regular adjustment of allowances in accordance with the difference between actual output and expected output during the compliance period.

Between 2013 and 2015, the total emission cap for the Shenzhen ETS is 118 million tons, including 107 million tons of allowances and 11 million tons of offset credits. The annual allowances in 2013, 2014 and 2015 are 33.2 million tons, 33.78 million tons and 34.78 million tons, respectively, accounting for 40% of total GHG emissions in Shenzhen.

The pros and cons of cap setting

Pros

The dual control on absolute carbon emissions and carbon intensity has unique advantages. On the one hand, Shenzhen sets the cap according to the economic development of regulated companies, ensuring the regulated companies' total carbon emissions do not exceed the absolute emissions target and limiting the growth of absolute emissions. On the other hand, Shenzhen sets carbon intensity targets for each sector and regulated company according to the historical carbon emission intensity of each regulated company and sector. It also adjusts the allowances for each regulated company based on its actual production or actual industrial value added. When there is a dramatic change in economic activity, adjustment of actual production or industrial value added may balance the demand and supply in the carbon market. This design has two advantages: First, in the boom years of the economy, the additional energy consumption and carbon emissions for regulated companies would not be restricted. Also, the design guarantees that the speed of growth and volume of emissions are lower than the business-as-usual situation. Second, in economic recession years, there would not be an excessive surplus caused by the decrease in output and energy consumption, ensuring a more balanced demand and supply and preventing negative impacts on long-term emissions reduction from sharp falls in allowance prices.

Cons

The design of carbon intensity targets for each regulated companies increases the complexity of the emissions trading system, and brings extra management and administrative costs to regulated companies and the competent authority. Data for the industrial value added is requested in order to calculate the carbon intensity target, but

regulated companies have often not attached great importance to industrial value added for a long time. The selection of method to calculate industrial value added also impacts on the results. Therefore, the Shenzhen ETS must establish an extra mechanism to standardise the measuring, reporting and verification of data for industrial value added. Meanwhile, regulated companies must learn and master the method so as to correctly calculate their industrial value added, submit it to the statistical office, and have it recognised, increasing the workload and time required of regulated companies.

1.2.2 Scope and coverage

1.2.2.1 Selection criteria

The establishment of the Shenzhen ETS follows a “step by step” principle. In general, there are “four emission types and three main sectors”. The “four emission types” refers to direct emissions of regulated industrial companies, indirect emissions of regulated industrial companies, emissions from buildings and emissions from transportation. The “three main sectors” refers to major emitters in the industry, buildings and transportation sectors.

In the initial stage, the Shenzhen ETS covers industry and large public buildings. The reasons are as follows.

First, industry has the largest amount of energy consumption among all sectors, accounting for 33% of energy consumption in 2010. Also, the level of energy consumption and abatement cost differs considerably among industrial sub-sectors, meeting the theoretical requirements of a carbon emissions trading system.

Second, buildings account for 23% of energy consumption, and for 43% of the total electrical load. Meanwhile, the energy consumption per unit area of buildings in Shenzhen is over three times that in developed countries. In addition, due to the increasing number of new buildings, and extensive usage of glass wall and large windows, the trend of energy consumption for buildings is increasing.

In the selection of regulated companies, the Shenzhen ETS covers the companies whose emissions exceeded 3000 tons of carbon dioxide equivalent in any year between 2009 and 2011, and large-scale public buildings as well as large office buildings for government departments whose area comprises more than 20,000 square meters. Shenzhen plans to gradually incorporate more companies, buildings and the transportation sector into the Shenzhen ETS. In total, there are 635 industrial companies covered by the Shenzhen ETS. Their industrial value added, GDP and emissions account for 59%, 26% and 38% of Shenzhen’s total, respectively.

1.2.2.2 Steps to selection

Apart from power generation and processing industries, the industrial (manufacturing) sector has a large number of companies from a wide variety of industries. In many cases, there is a lack of GHG emissions data for each industry. However, establishing an effective carbon trading market (or achieving the emission reduction target via market mechanism) requires that total emissions from companies incorporated into the ETS account for a substantial proportion of total emissions in the region. Therefore, Shenzhen finally determined a list of around 800 industrial companies by cross-referencing name lists from five channels, and then conducted verification on historical emissions of key emitters. These five channels are: the top 800 companies according to the Shenzhen Municipal Statistical Bureau, based on their industrial added value calculated by both production approach and expenditure approach; the top 1000 companies according to the Power Supply Bureau, based on their electricity consumption; companies consuming a large amount of oil from PetroChina, Sinopec and CNOOC; the top 100

companies consuming a large amount of gas according to the Shenzhen Gas Industry Association; and, the list of companies with furnaces according to the Shenzhen Market Supervision Commission.

During the process of actual investigation and verification, the names of companies which were not suitable to be incorporated into coverage were deleted from the list. This included companies that provided supporting documents and evidence stating that either their large-scale or all factories would leave the Shenzhen district, or companies that provided evidence of a large decrease in energy consumption via transforming the type of products. Finally, a total of 635 companies were selected as regulated companies under the Shenzhen ETS.

During Phase I of the Shenzhen ETS, a number of large public buildings needed to be incorporated in to the ETS in order to form a sizeable ETS for buildings. During the process of actual investigation and verification, emissions data for 350 large public buildings was examined, and coverage was determined via the following three criteria. First was to guarantee that the buildings fell above or below the threshold for energy consumption. Second was to delete the buildings that could not be contacted or were not suitable for verification from the list. Third was to delete the buildings with too many property owners and under a complex situation from the list. Through verification, a total of 197 buildings were covered by the Shenzhen ETS.

1.2.3. Allowance allocation

1.2.3.1 Allowance allocation method

Shenzhen adopted two methods for allocation. One is free allocation and includes allowances for pre-allocation, reserve allowances for new entrants and allowances for post-adjustment. The other method allows for allowances to be sold by auction or at fixed price.

1.2.3.2 Allocation methodology for pre-allocated allowances

Shenzhen uses a benchmark method to distribute pre-allocated allowances based on emissions structure and characteristics of sectors to make sure that both efficiency and equity are guaranteed.

For single-product sectors, including power generation and supply, water supply as well as gas supply, the pre-allocated allowances are a preliminarily determined amount calculated based on the sectoral carbon intensity benchmark and expected output. In other words, pre-allocation allowances equals the sectoral carbon intensity benchmark multiplied by expected output.

For non-single-product sectors, namely most manufacturing companies (such as telecommunication equipment, machinery & equipment manufacturing etc.), industrial value added is selected as a unified standard due to a wide range of products. The pre-allocated allowances is equal to the carbon intensity target (benchmark) of each regulated company multiplied by the expected industrial value added.

1.2.3.3 Limited circulation game theory

To fully play the role of guiding a reduction in emissions, the manufacturing sector was incorporated into the ETS. The inclusion of the manufacturing sector means that the Shenzhen ETS features the following significant characteristics: Firstly, indirect emissions (from electricity purchased outside Shenzhen) are the principal component of emissions from Shenzhen's manufacturing sector. Secondly, a great variety of sectors and industries are incorporated into the ETS, leading to imperfect information. The Shenzhen ETS covers 26 industrial sectors and 515 industrial companies which have complex division between upstream and downstream systems and

diversified products, production technology, processes, and major energy consuming devices. Also, their energy statistical system is often unsound, and information relevant to GHG emissions is missing. Thirdly, in relation to allowance allocation, both government and companies lack comprehensive knowledge. In particular, the government does not have a clear idea on the distribution of carbon intensity in the manufacturing sector, and does not understand companies' internal information, while companies do not understand the distribution by sector, and internal information of other companies.

In view of reasons above, the core design of the allowance allocation mechanism of Shenzhen manufacturing sector is to fully allow, encourage and guide regulated companies to participate in allowance allocation and to let them know how they could affect the market equilibrium via taking an active strategy under uncertainties. In other words, the information could be delivered, shared and exchanged efficiently through repeated 'games' between the government and companies, and between companies themselves.

Therefore, Shenzhen uses an innovative method based on limited circulation game theory to identify the carbon intensity target for each manufacturing company. Manufacturing companies are grouped by sub-industry type, product type and their size. The government pre-determines the cap for each group based on its carbon intensity target, and then requests companies from the same group to submit their goals for 2013-2015 carbon emissions and industrial value added via game-theory software. Then, the allowances are pre-allocated according to the results from the game-theory software. The company can choose to accept or reject the result. If the company chooses to accept the results, it takes the allowances and quits the process. If the company chooses to reject, it may follow the same steps to re-submit and re-allocate until they stop changing the data they submit. The game-theory software will disclose the allowance allocation information to members in the same group during the process, to make sure that asset allocation can be effectively delivered to each company. The carbon intensity target for each company is calculated based on the carbon emissions and industrial value added eventually accepted by the company.

Between 2013 and 2015, the pre-allocation allowances for the Shenzhen ETS are equal to 101 million tons. In 2015, the total amount of allowances from sectors covered by the Shenzhen ETS will be 7.8% more than the emissions in 2010. However, carbon intensity will be 36.8% lower, an average drop by 8.8% annually. The carbon intensity of manufacturing companies will have declined by 37.81% whereas that of water, gas, and electricity sector will have declined by 5.43%.

1.2.3.4 Post-adjustment of allowances

Shenzhen uses the actual output or actual industrial value added information to adjust allowances to alleviate impacts from allowance surplus or shortfalls caused by economic fluctuation. First, the competent authority will determine the actual free allowances for the previous year based on the actual output (for single-product sectors) or industrial value added (for manufacturing companies). Compared with the pre-allocated allowances for the previous year, the competent authority will then give more or deduct allowances accordingly. To guarantee that the total amount of allowances would not break the allowance cap due to allowance post-adjustment, the amount of extra allowances that are given to regulated companies shall not exceed the amount of allowances that are deducted from regulated companies.

1.2.3.5 Pros and cons of allocation method

Pros

Shenzhen uses a benchmark method to allocate allowances for regulated companies, which improves the fairness of

allowance allocation for single-product sectors. For manufacturing companies, setting a carbon intensity target for each regulated company enhances the feasibility of reducing emissions. During the process to allocate allowances for manufacturing companies, Shenzhen developed software based on limited circulation game theory, which helps the competent authority to obtain a carbon intensity target for each company in the context of imperfect information, increases companies' participation during allowance allocation and enhances efficiency. Within one week, Shenzhen completed the allowance allocation for more than 600 manufacturing companies. Meanwhile, using electronic allocation software effectively avoids human interference during allowance allocation, and avoids potential rent-seeking behaviour.

Cons

Compared with grandfathering and other benchmark methodologies, it is difficult to explain and make the regulated companies fully understand the limited circulation game theory approach. Therefore, regulated companies may doubt the results of allocation. Also, this method requires a solid database including companies' historical carbon emissions and industrial value added, reasonable criteria for industrial classification and the industrial baselines. Therefore, it is hard to implement perfectly.

1.2.4 MRV

1.2.4.1 MRV rules and guidelines

Shenzhen Market Supervision Commission (SZ MSC) issued separate protocols and guidelines both for quantification and reporting, as well as verification of organisational-level GHGs, which specify relevant principles and requirements. The two sets of guidelines were developed based on international GHG protocols, such as ISO 14064-1 (Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emission and removal and Greenhouse Gas Protocol: Verification and Reporting Guideline). Shenzhen also issued quantification, reporting, and verification guidelines for buildings.

Shenzhen does not request companies to formulate and submit annual emission monitoring plans because the covered companies in the Shenzhen ETS are from a wide range of sectors, with a wide range of products and of various sizes, as well as experiencing large fluctuations in production.

1.2.4.2 Accounting methodology

In terms of accounting methods, Shenzhen uses a computational method to account for carbon emissions from companies. Calculation methods include emission factors, material balance, modelling, and equipment-specific correlation. Currently, Shenzhen mainly uses emission factor and material balance methods to calculate carbon emissions.

1.2.4.3 Content of reporting

In terms of content, industrial companies are required to submit a report on their production information or industrial value added in addition to annual carbon emissions. In terms of the frequency of reporting, carbon emissions reports are required to be submitted quarterly and annually, while production information and industrial value added reporting is required to be submitted annually. In terms of the mode of reporting, Shenzhen set up a GHG information management system, which allows the submission of both paper and electronic reports at the same time. In terms of the hierarchies of reporting, reports are requested to be submitted at enterprise level

because Shenzhen has a large amount of small and medium sized companies, large indirect emissions and low accuracy of monitoring at the facility level.

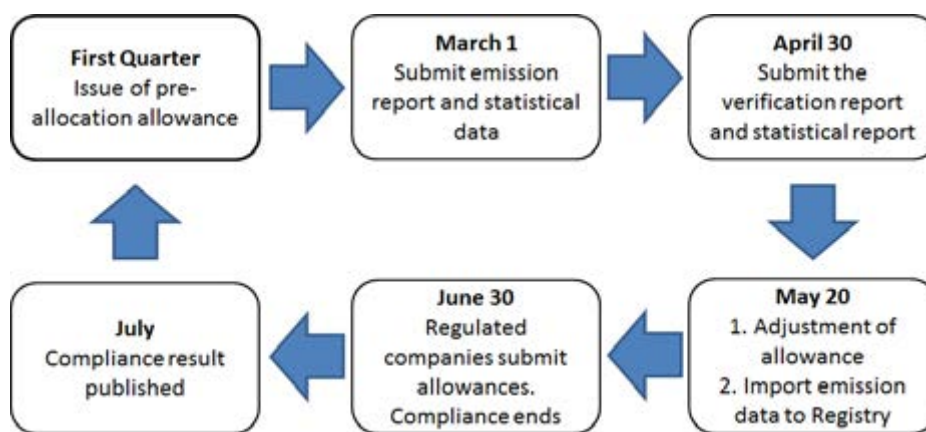
1.2.4.4 Verification requirements

To guarantee the accuracy of emissions data, Shenzhen established a Greenhouse Gas Data Verification System which requires a 3rd party verification agency to verify the emissions data submitted by the regulated companies. The 3rd party verification agency shall ensure the accuracy and the scientific integrity of data. Shenzhen also set rules on verification agency administration, the date to submit verification reports and the organisation to submit verification reports in accordance with the characteristics of GHG emissions reports and statistical report of indicators.

1.2.4.5 Key dates

Regulated companies formulate an annual report on carbon emissions based on quantification and reporting guidelines, and submit the report to Shenzhen Development and Reform Commission (SZ DRC) via the GHG Information Management System on 31st March each year. Regulated companies also formulate a report on production information or industrial value added and submit it to the Shenzhen Statistics Bureau by 31st March.

Once the annual report on carbon emissions is submitted, the regulated company should then invite verification agencies to check the report and submit the verified report to SZ DRC by 30th April. The verified report on actual output or industrial value added should be submitted to SZ DRC by 10th May once verified by the Shenzhen Statistics Bureau.

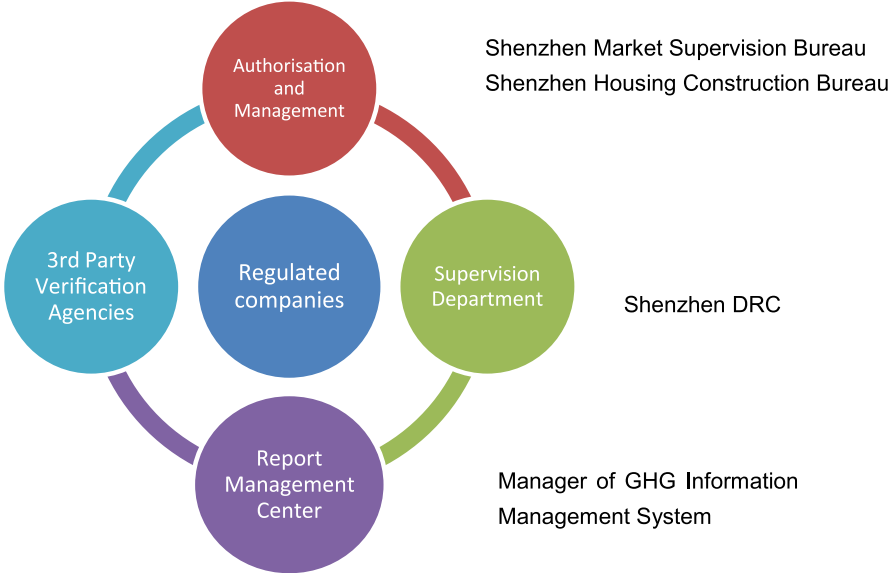


Graph 1.4 Compliance cycle

1.2.4.6 Competent authorities and their responsibilities

SZ MSC and the Housing Construction Bureau (SZ HCB) provide accreditation services to the third-party verification agencies and their verifiers. The SZ MSC protocol and guideline on quantification and reporting, as well as verification, authorises verification activities for industrial regulated companies, as well as supervision and monitoring of the behaviour of verification agencies and their verifiers. The SZ HCB supervises and monitors the verification agencies and their verifiers for buildings.

SZ DRC supervises the verification process and checks the reports from third-party verification agencies, penalises unlawful acts, and advises SZ MSC to remove the names of verification agencies that conduct unlawful acts from the accreditation list. Meanwhile, it takes responsibility for managing the GHG Information Management System.



Graph 1.5 MRV: Competent Authorities

1.2.5 Market Adjustment Mechanism

1.2.5.1 Market adjustment mechanism

Shenzhen established an allowance reserve mechanism and an allowance buy-back mechanism in order to avoid significant price fluctuation and stabilise abatement cost.

The allowance reserve mechanism consists of two scopes. The first is to allow companies or buildings to bank allowances, in other words, allowances can be used during later compliance periods. The second is to establish a price containment reserve to stabilise the price. The reserved allowances can be sold when the price is higher than expected, and are sold at fixed price. The price is set above the expected average abatement cost of regulated companies; increasing in accordance with the annual inflation rate. These allowances can only be sold to regulated companies for compliance; other market participants are not eligible to purchase them.

The allowance buy-back mechanism allows the competent authority to buy allowances from the market at a pre-set proportion and price once the price drops below a certain level. The buy-back mechanism is designed to support the allowance price, that is, to stabilise the allowance price by reducing supply in the market.

To avoid excessive intervention from the government, Shenzhen imposes restrictions on the amount, frequency and triggering conditions for the price control reserve mechanism and allowance buy-back mechanism. For example, the price containment reserve consists of the combination of the set-aside allowances equal to 2% of annual allowance cap, unused allowances from the new entrants reserve, and the allowances bought back from the market by the government. The government can only buy back less than 10% of the allowances in circulation.

1.2.5.2 Benefits of the market adjustment mechanism

The Shenzhen market adjustment mechanism has the following three characteristics: First, it directly affects market demand and supply rather than market price. In other words, Shenzhen influences the price via regulating the balance between demand and supply, rather than directly regulating the fluctuation range of the market price. The advantage of this is that it allows for full use of the market mechanism to allocate resources and realise price discovery, meeting the intended purpose of a carbon emissions trading scheme. Second, it allows Shenzhen to undertake two-way market regulation, by either containing a significant rise in price by reducing market demand, or preventing a significant drop in price when supply exceeds demand. Third, Shenzhen imposes restrictions on the power for market adjustment from the government to ensure that the market function plays its role in balancing demand and supply. The Shenzhen market adjustment mechanism ensures that the government's intervention in the market is predictable and limited, preventing the possibility of unlimited intervention and guaranteeing that the market function comes into play.

1.2.6 Offsetting mechanism

Shenzhen has introduced an offset mechanism and allows regulated companies to use China Certified Emissions Reductions (CCERs) to fulfil their compliance obligation. One CCER is equal to one allowance, and the regulated companies can use up to a maximum 10% of their annual actual emissions, in place of allowances.

In order to avoid double counting, regulated companies are not allowed to use CCERs generated within the verification boundary to fulfil their obligations.

1.2.7 Enforcement and penalties

The Shenzhen ETS is built on a strong legal basis. In October 2012, the Standing Committee of the Shenzhen People's Congress passed the Provision, which was China's first local regulation specifically on carbon emissions management. It was voted as one of nine highlights in global climate change legislation by the Global Legislators Organisation (GLOBE). In March 2014, Shenzhen Municipal Government published the Regulation. Shenzhen was the first pilot to establish a comprehensive legal system for emissions trading.

The legal system on carbon emissions trading in Shenzhen has the following two highlights: First, it makes clear and detailed regulations on carbon emissions trading. The Regulation has 8 chapters and 84 articles, making it the most significant among the pilots, in terms of the length and depth of content. Second, it sets severe punishments for non-compliance. For example, the Provision requires the competent authority to fine regulated companies that do not submit sufficient allowances for compliance as much as three times the market price per ton of CO₂ of excess emissions, making it the heaviest penalty for non-compliance in China. Specific unlawful acts and corresponding legal liability are shown in Table 1.1.

Table 1.1 Shenzhen ETS Penalty Rules

Regulatory objects	Unlawful Act	Penalty Rules
Regulated Companies	Failure to submit allowances on time	Forfeit the equal amount of allowances, and fined three times the market price per ton of CO ₂ of excess emissions
	Fictitious data	Corrections and fines
	Collusion with 3 rd party verification agencies and providing fictitious data	Corrections and fines
Third Party Verification Agencies	Collusion with regulated companies, and providing fictitious data	Corrections and fines
	Fictitious or false reporting	Corrections and fines
	Unfair competition	Corrections and pay monetary penalty equal to CNY50,000 – 100,000
	Disclosure of confidential information of regulated companies	Corrections and pay monetary penalty equal to CNY50,000 – 100,000; compensation for losses
Market Participants	Illegal transactions	Corrections and pay monetary penalty equal to CNY50,000 – 100,000
CEEX	Failure to fulfil responsibilities	Corrections and pay monetary penalty equal to CNY50,000 – 100,000; Legal accountability
Government Officials	Abuse of authority, dereliction of duty, playing favouritism and committing irregularities.	Administrative penalties; compensation for losses; legal accountability

1.3 Comparison with other domestic pilots

The ETSs in other domestic pilots are designed in accordance with their local level of economic development and industrial structures, meaning that the designs are quite different. This section will show the differences between the Shenzhen ETS and other domestic ETSs, especially Beijing, Shanghai, and Guangdong.

Table 1.2 Comparison among domestic EITs

Key Issue	Shenzhen	Shanghai	Beijing	Guangdong
Emission Reduction Target (2015)	21% (Compared to 2010)	19% (Compared to 2010)	18% (Compared to 2010)	19.5% (Compared to 2010)
GHG Gases	CO ₂	CO ₂	CO ₂	CO ₂
Threshold	3,000 tons	20,000 tons for industrial companies, 10,000 tons for non-industrial companies	10,000 tons	20,000 tons
Regulated Companies	635 enterprises 197 public buildings	191 enterprises	490 enterprises	Y2013: 202 enterprises, 40 new entrants; Y2014: 193 enterprises, 18 new entrants
Industry types	26 industries including electricity, water, power, manufacturing	Industrial sectors: Steel, chemical, electricity; non-industrial sectors: hotels, shopping mall, harbour, airport, aviation sector	Energy, manufacturing, cement etc.	Electricity, cement, steel, petrochemical
Total amount of allowances	30 million tons per year	160 million tons per year	55 million tons per year	388 million tons per year
Allowance Allocation Approach	Free allocation, sell at fixed price, auction	Free allocation, auction	Free allocation	Free allocation, auction
Allowance Allocation Method	Benchmark: single-product sector and buildings; Competitive game theory: manufacturing sector	Grandfathering: industrial sector (except electricity sector), shopping mall, hotel, and commercial buildings; Benchmark: electricity sector, harbour, aviation and airport sector	Grandfathering: electricity and thermal sector, cement industry, chemical industry, other industrial sectors, and service; Benchmark: new facilities	Grandfathering: combined heat and power plant, cement, petrochemical, and steel (short-term process) Benchmark: electricity, cement, steel (long-term process)
Compliance Period	Year-by-year	Year-by-year	Year-by-year	Year-by-year
Market Adjustment	Price containment reserve; Buy-back mechanism	5% reserve	Buy-back mechanism	5% reserve
Offsetting Mechanism	CCER 10%	CCER 5%	CCER 5% (>50% from Beijing)	CCER 10% (>70% from Guangdong)

MRV	Submit verified report to competent authority before 30 th April	Submit verified report to DRV before 30 th April	Submit annual emissions report and 3 rd party verification to competent authority	Submit verified report of previous year's emission information to competent authority
3rd Verification agency Management	Accreditation of verification agencies and verifiers	Recording management	N/A	Recording management
Penalty Rules	<ol style="list-style-type: none"> 1. Pay a monetary penalty equal to three times the average market price of allowances 2. Report to credit management institutions 3. Cancel all financial aid and approval of future financial aid applications for five years 	<ol style="list-style-type: none"> 1. Pay a monetary penalty equal to 50,000 CNY and 100,000 CNY 2. Report to credit management institutions 3. Cancel all financial aid and approval of future financial aid application for five years + qualification on energy saving 	<ol style="list-style-type: none"> 1. Pay a monetary penalty equal to three to five times the average market price of allowances 	<ol style="list-style-type: none"> 1. Forfeit twice as many allowances, and pay a monetary penalty equal to 50,000 CNY 2. Report to credit management institutions 3. New entrants do not need approval

1.3.1 Cap setting

All pilots have set intensity-based emission caps in accordance with total energy consumption and growth rate, their energy intensity target, carbon emission target, GDP growth rate, and historical emissions. Beijing, Shanghai, Guangdong and Shenzhen ETSs all combine top-down with bottom-up to set an emission reduction target.

The selection of the base year is different among pilots. Beijing selected 2005-2010 as its base years; Shanghai chose 2008-2010 as its base years; Guangdong does not clearly specify its selected base year. Shenzhen selected 2010 as its base year.

Shenzhen is the smallest region with the lowest amount of carbon emissions covered: about 30 million tons. The level of carbon emissions covered by Beijing, Shanghai and Guangdong are 55 million tons, 160 million tons and 388 million tons, respectively. Guangdong has the largest level of carbon emissions covered. The differences in the amount of carbon emissions covered reflects the differences in economic structure, industrial structure and energy consumption structure among the pilots. In terms of proportion of emissions covered under the ETS, 60% of emissions in Guangdong are covered by the Guangdong ETS, while Beijing, Shanghai and Shenzhen ETS each cover about 40% of total emissions, respectively.

1.3.2 Scope and coverage

All pilots have followed a strategy of focusing on larger enterprises by incorporating energy-intensive industries into the ETS, i.e. power generation, petrochemicals, cement, and iron and steel etc. In terms of emission sources, all pilots involve both the direct emissions and indirect emissions of regulated companies from industrial sectors. It should be noted that Shanghai includes mobile sources such as aviation and Shenzhen is aiming to include the transportation sector in addition to stationary sources, whereas Beijing and Guangdong ETS only cover stationary sources.

In terms of the threshold, Guangdong covers the companies whose emissions exceed 20,000 tons of CO₂ per year because individual companies in Guangdong have a relatively large amount of carbon emissions. Beijing and Shenzhen both have advanced tertiary industry, and a single company from the tertiary sector has a relatively small level of carbon emissions. Therefore, the threshold in the Beijing and Shenzhen ETSs are low. For example, the Beijing ETS covers the companies whose emission exceeds 10,000 tons of CO₂ per year between 2009 and 2011. For Shenzhen, the threshold is only 3000 tons of CO₂. It should be noticed that Shanghai sets different thresholds for companies from industrial sectors and non-industrial sectors. The threshold for industrial companies is 20,000 tons of CO₂ in either 2010 and 2011 whereas the threshold for non-industrial companies is 10,000 tons of CO₂ during the same period.

1.3.3 Allowance allocation

The pilots are separated into two groups according to whether free allocation is employed. On the one hand, Beijing only uses free allocation; on the other, Shanghai, Shenzhen and Guangdong allow both free allocation and non-free allocation. In the second group, Shanghai and Shenzhen carry out irregular auctions to allocate allowances, while Guangdong is the only pilot that has carried out regular auctions. In 2013, regulated companies covered by Guangdong were obliged to follow a “ticket system” whereby they must buy 3% of their allowances so as to activate 97% of free allowances. In 2014, Guangdong cancelled the ticket system and introduced a post-adjustment mechanism and gradually increased the auction floor price.

In terms of allowance allocation approaches, most pilots combine grandfathering with the benchmark approach. Only Shenzhen makes sole use of the benchmark approach to allocate allowances.

In terms of the frequency of allowance allocation, Beijing, Guangdong and Shenzhen allocate allowances year-by-year. Shenzhen allowances are determined for three years but issued year by year whereas Beijing and Guangdong determine and issue the allowances year-by-year. Shanghai distributed and issued allowances for 2013, 2014 and 2015 during the first compliance period (2013).

In terms of allowance adjustment, some pilots set up allowance post-adjustment mechanisms in accordance with fluctuation in economic growth. Shenzhen is the first pilot to establish an allowance post-adjustment mechanism. Each year, the competent authority determines the actual amount of allowances for the previous year based on actual output or industrial value added, and adjusts the amount of pre-allocated allowances.

1.3.4 MRV

Pilots have issued GHG quantification and reporting guidelines and emissions verification guidelines in accordance with their own characteristics. In terms of GHG calculations, all pilots use the emissions factor and material balance methods to calculate emissions. Beijing and Shenzhen only issued a general verification guideline applicable to all sectors, whereas Shanghai issued nine specific verification guidelines for the power sector, petrochemical sector, iron and steel sector etc. Guangdong issued four separate verification guidelines for its covered sectors.

All pilots have established third-party verification rules and guidelines to verify annual carbon emissions of regulated companies and ensure the accuracy of carbon emission data.

All pilots have established admittance criteria for third-party verification agencies, and operated strict supervision over their admittance. Beijing sets thresholds on the capital, the business activity and human resource capacity of verification agencies, as well as setting specific rules for the verifiers. Shanghai specified a process to select verification agencies. In Guangdong, CNY10 million is requested as registry capital. It also allows national organisations (such as CQC) to transfer experienced verification staff from other provinces to provide verification services for Guangdong province. But Guangdong does not set specific requirements on the qualification of verifiers. Shenzhen established a records system for both verification agencies and their verifiers. It imposes the most severe restrictions on the qualification of verifiers in terms of study major, age and length of work experience.

1.3.5 Market adjustment mechanism

Shenzhen established a market adjustment mechanism, including a price containment reserve and allowance buy-back mechanism. To tackle price fluctuation in the carbon market caused by economic activity, Guangdong reserves 5% of allowances for market adjustment. Beijing also establishes an early warning mechanism regarding the trading price, namely, when the price of allowances fluctuates in a volatile way, the competent authority can use auctioning or the allowance buy-back mechanism to stabilise the price.

1.3.6 Offsetting mechanism

All pilots have established an offsetting mechanism to reduce compliance costs. In terms of the proportion of CCERs that can be used for compliance purposes, the regulated companies in Shenzhen and Guangdong can use a maximum of 10% while companies in Shanghai and Beijing can use only 5%.

In terms of the origin of CCERs, Guangdong requires at least 70% of CCERs to come from Guangdong Province. Beijing requires at least 50% of CCERs to be from Beijing. If CCERs are from outside Beijing, CCERs from western regions take priority.

In order to avoid double counting, regulated companies are not allowed to use CCERs generated within the verification boundary in order to fulfil their obligations.

1.3.7 Enforcement and penalties

The regulated companies that fail to comply with allowance management regulations, MRV rules and other regulations will be punished. The penalties fall into four main categories: paying a monetary penalty, forfeiting a certain quantity of allowances, published criticism through social media and government websites, as well as reporting to the Fiscal Department for cancelling of all financial aid and of future financial aid applications. The Shenzhen ETS is the only pilot that applies all four penalty types.

For the regulated companies that fail to submit sufficient allowances to the local DRC to offset their emissions for the previous year, Guangdong sets the most severe penalties. If enterprises emit more emissions than the quantity of allowances/CCERs, it must forfeit twice the quantity of allowances and pay a monetary penalty equal to CNY50,000. Guangdong, Shenzhen and Shanghai set specific rules on publishing criticism through social media and government websites. Regulated companies in Shenzhen or Shanghai which fail to comply with the rules will be reported to the Fiscal Department which will cancel all financial aid and approval of future financial aid applications. Beijing requires companies which fail to obey the rules to pay a monetary penalty equal to 3 to 5 times the average market price of allowances.

For regulated companies that fail to comply with MRV rules, Shenzhen sets the most severe penalty. The company has to make amends and pay a monetary penalty equal to three times the average market price of allowances. In Guangdong, the monetary penalty should not exceed CNY50,000. In Shanghai and Beijing, the penalty rules only allow for warning and mild punishment.

1.4 Comparison with international ETS

1.4.1 Shenzhen ETS and the EU ETS

The cap setting of the Shenzhen ETS differs from that of the EU ETS. The EU ETS set an absolute emissions reduction target, and the cap is reduced each year by a certain percentage. Shenzhen sets an absolute emission reduction target for regulated companies overall, and sets a relative emission target (carbon intensity target) for each individual regulated company. Shenzhen's absolute cap can increase year by year, but the carbon intensity of each regulated company and the average carbon intensity of all regulated companies must decrease year by year.

The scope of companies covered by the Shenzhen ETS is different from that of the EU ETS. The entities covered by the EU ETS are direct emitters from high energy-consumption and high-emission industries, such as power generation, iron and steel, cement and chemicals. The EU ETS controls the emissions of CO₂ and other GHGs (namely, nitrous oxide and perfluorocarbons). In addition to the energy sector, Shenzhen predominantly covers manufacturing industries in its ETS. The Shenzhen ETS controls both direct and indirect emissions from covered industries. In the initial stage, Shenzhen only controls emissions of CO₂. It is noteworthy that the EU ETS incorporates the aviation sector into its coverage, while the transportation sector will be gradually incorporated into the Shenzhen ETS. In addition, the liable entities within the EU ETS are individual facilities, whereas the liability in the Shenzhen ETS lies with companies.

From Phase III of the EU ETS, auctioning is the only approach used to allocate allowances for power companies (except eight countries in Eastern Europe). The benchmark method is adopted for allowances for non-power companies. Free allocation is the main approach used to allocate allowances in Shenzhen, but at least 3% of the annual SZAs must be auctioned. Shenzhen has already organised an auction to facilitate compliance. Both Shenzhen and the EU use the benchmarking method to allocate allowances for free, however the benchmarking in Shenzhen is based on the carbon emissions per actual output or industrial value added whereas the benchmarking in EU is based on the carbon emission per output of one product. Therefore, the EU sets the benchmark in accordance with product types whereas Shenzhen sets the benchmark in accordance with industrial value. In other words, the benchmark of the same type of product in EU ETS is consistent, but in the Shenzhen ETS, the benchmark for different regulated companies could be different.

In phase I and phase II, the EU ETS did not set a market adjustment mechanism. Therefore, it could not adopt measures to tackle excess surplus of allowances and its price faced a significant decline, removing the motivation for long-term emission reduction. Back-loading will come in to force, in order to adjust the amount of allowances to be auctioned during the early stage of Phase III. The EU has also explored the establishment of a reserve mechanism to stabilise the supply of allowances in the market. Shenzhen attaches great concerns to the problem of an allowance surplus faced by the EU ETS, and drew on the experience of the California ETS in setting up a price containment reserve mechanism to stabilise the price. The Shenzhen ETS also created an allowance buy-back mechanism to provide a relatively sophisticated market adjustment mechanism.

The EU ETS imposes restrictions on CDM products that can be used for offsetting. For example, large hydroelectric projects, re-forestation and afforestation projects and industrial gas projects were no longer accepted from 2013. CDM projects must be registered by the end of 2012 and be from either least developed countries or countries that have a bilateral agreement with the EU. The regulated companies covered by the Shenzhen ETS can use a maximum of 10% for offsetting, but currently the source and type of the offsetting projects are not published.

In terms of the design of MRV, both Shenzhen and the EU take their local situation into consideration. The companies covered by the Shenzhen ETS are mainly from the manufacturing sector, and feature huge differences in terms of product types, technology processes and devices. Therefore, Shenzhen has only issued general guidelines and rules on monitoring, reporting and verification. The EU ETS operates across multiple nations and multiple industries. Therefore, the EU Commission sets specific guidelines, and each country establishes MRV based on its situation.

In the EU ETS, operators failing to submit enough allowances will face fines. Operators payed a fine of 40 Euros for each allowance they failed to submit during EU ETS Phase I. In Phase II, they had to pay 100 Euros per allowance. Since the price of EUAs faced a significant decline, the penalty is relatively high as it exceeds 10 times the market price. Within the Shenzhen ETS, regulated companies failing to submit sufficient allowances will face a monetary penalty equal to three times the average market price of allowances. Since the Shenzhen carbon price has been the highest among pilots over a long period, and is at times within the highest price range in the international carbon market, the penalty is very severe.

Table 1.3 Comparison with EU ETS

Key Issues	Shenzhen ETS	EU ETS
Emission Reduction Target	Absolute cap and relative cap, i.e. carbon intensity	Absolute cap
GHGs	CO ₂	CO ₂ , N ₂ O, PFCs
Main industries	Manufacturing, transportation electricity generation	Electricity generation, traditional heavy industries, commercial aviation
Threshold	3,000 t CO ₂ e	25,000 t CO ₂ e
Transportation Regulated	Direct emissions from mobile sources	Emissions from aviation industry
Allowance Allocation Approach	<ol style="list-style-type: none"> 1. Allocate year-by-year 2. Benchmarking 3. Game theory 	<ol style="list-style-type: none"> 1. 100% auction except electricity generation sectors from 8 Eastern European countries 2. Benchmark for companies from non-electricity generation sectors, free allowances decrease year-by-year
Compliance Purpose	Year-by-year	Year-by-year
Market adjustment mechanism	<ol style="list-style-type: none"> 1. Auction 2. Price containment reserve 3. Allowance buy-back 	<ol style="list-style-type: none"> 1. Back-loading 2. Structural reform, establish a reserve mechanism to stabilise the market price
MRV	<ol style="list-style-type: none"> 1. Accreditation of verification bodies and verifiers 2. Submitted level-by-level 3. Report on carbon emissions and statistics data 4. Quarterly and annual report on carbon emissions 	<ol style="list-style-type: none"> 1. EU ETS passed guidelines on MRV, each member state sets up its own MRV procedure via the guidelines 2. Made adjustments in 2007 and 2012 3. Adjustments are available depending on the size of facility
Offsetting Mechanism	Up to 10% of emissions; CCER	<ol style="list-style-type: none"> 1. CERs from CDM projects and ERUs from JI projects 2. Companies which receive free allowances from phase two between 2008 and 2020 cannot use 11% of offsetting credits or of free allowances received between 2008 and 2012 3. The new entrants from phase three between 2008 and 2020 can only use 4.5% free allowances received from 2013 to 2030 4. Companies that have new facilities in Phase Three between 2008 and 2020 cannot use the credits used from 2008 and 2012, the 11% of free allocated allowances from 2008 to 2012, or the 4.5% of emissions from 2013 to 2020 5. Airline businesses can use 1.5% of emissions from 2013 to 2020

Penalty Rules	<ol style="list-style-type: none"> 1. Forfeit an equal quantity of allowances; 2. Pay a monetary penalty equal to three times the average market price of allowances; 3. Published notice of criticism through social media and government websites; 4. Reported to credit management institutions; 5. Reported to Shenzhen Municipal Fiscal Department to cancel all financial aid and approval of future financial aid applications for five years. 	<ol style="list-style-type: none"> 1. Phase One: 40 Euros/ton 2. Phase Two: 100 Euros/ton 3. Phase Three: 100 Euros/ton, forfeit an equal quantity of allowance, name-calling
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1.4.2 Shenzhen ETS and the California ETS

Officially launched in January 2013, the Californian carbon market has a sound infrastructure, while having both differences and similarities with the Shenzhen ETS.

Like the EU ETS, the California ETS sets an absolute cap. Setting a goal for 2020, the California ETS distributes emission reduction targets between the 2013-2020 compliance years. Emissions should decline by 2% in 2013 and 2014, and by 3% afterwards each year to 2020.

In terms of coverage, the California ETS goes beyond both the EU ETS and the Shenzhen ETS, incorporating six types of GHGs. Besides traditional energy generation sectors and large industrial emission sources, California incorporates the suppliers and distributors of fossil fuels into its coverage so as to limit emissions from transportation, commercial buildings and residential houses.

Within the California ETS, two modes are adopted for allowance allocation: one is free allocation, the other is auctioning. For industrial companies, the allowances are allocated for free in accordance with an industrial benchmark. The allowances are distributed at 50% - 100% of the industrial benchmark. The free allowances received by the distributors of electricity must be auctioned by the government, and the profits are used to subsidise consumers' energy bills. Free allowances are not directly allocated to the electricity generators. Other allowances are allocated via auctioning.

California established an allowance price containment reserve (APCR) to stabilise the price of allowances, namely to avoid significant rises in price. The APCR is organised at three tiers. At each tier, allowances would be sold at fixed price. In 2012, the allowances from the first, second and third tier were set at 40 US Dollars, 45 US Dollars and 50 US Dollars respectively. The price will increase by 5%. Including the annual inflation cost, by 2020, the price of allowances from the first, second and third tiers will be 60 US Dollars, 67 US Dollars, and 75 US Dollars, respectively. Regulated companies can buy allowances from the APCR at a fixed price. The sources of APCR allowances include: a) a proportion of total allowances reserved at the beginning, including 1% of the total amount of allowances between 2012 and 2014, 4% of the allowances between 2015 and 2017, and 7% of the allowances between 2018 and 2020, accounting for about 5% of the total amount of allowances between 2012 and 2020; b) allowances unsold at auction; c) 75% of punitive allowances (4 times of excess emissions over the allowance). Shenzhen has drawn on the experience of California and established its price containment reserve mechanism to control the market price, as well as establishing an allowance buy-back mechanism to adjust supply in the carbon market.

In terms of MRV, California requires regulated companies to hire a verification agency to verify its emissions report once submitted. Once the verification agency finishes its task, it must submit the verification report to

the California Air Resource Board (CARB). Some companies can verify their emissions report annually; some must submit the complete verification report once during each compliance cycle and a simplified verification process during the other 2 years. Simplified verification means that these companies are not required to conduct on-site checking. The verification agency used must be changed after providing verification services for the same regulated company for 4 years. This verification agency only can be re-hired after three years. CARB attaches importance to preventing a conflict of interest between the verification agency and the regulated company. The verification agency must assess its conflict of interest and then submit an assessment report to CARB so as to receive permission from the latter. If the regulated company fails to provide regular reports, or doesn't submit the verification report in time, or does not agree with the opinion from the verification agency, it can file an appeal to CARB. If CARB finds problems when auditing the verified report, it can directly determine the emissions of the company and the amount of allowances that need to be submitted for compliance purposes. The verification agencies and their verifiers must receive approval from CARB. Drawing on the experience of the California ETS, Shenzhen has given the competent authority the power to supervise verification activities and does not allow the same verification agency to provide verification services to the same regulated company for three consecutive years.

The California ETS also introduced an offsetting mechanism to reduce compliance costs; offset credits can be used for at most 8% of compliance. It also imposes restrictions on the qualified project types. The methodology is developed and recognised only by CARB. By December 2014, five types of offset projects are recognised, including ozone depleting substance (ODS) projects, livestock projects, urban forest projects, forestry projects, and coal mine methane capture projects.

The California ETS specifies the penalties for companies which fail to comply with the obligations, that is, they emit more than their quantity of allowances or fail to submit the allowances on time. If the regulated companies fail to submit the allowances before June 30, they must forfeit four times as many credits as their extra emissions. In addition, if the regulated companies fail to submit the required amount of allowances 30 days after the penalty comes into effect, they must pay a monetary penalty equal to 25,000 US Dollars per unit of extra allowances every 45 days. CARB also has the authority to pause, cancel, or restrict the registry account of regulated companies.

Table 1.4 Comparison with California ETS

Key Issues	Shenzhen ETS	California ETS
Emission Reduction Target	Absolute cap and relative cap, i.e. carbon intensity	Absolute cap
GHGs	CO ₂	All six types of GHGs
Main Industries	Manufacturing, transportation, electricity generation	Manufacturing, electricity distributors, suppliers of fossil fuels
Threshold	3000 t CO ₂ e	25,000 t CO ₂ e
Transportation regulated	Direct emissions from mobile sources	Upstream energy supplier
Allowance Allocation Approach	1. Allocate year-by-year 2. Benchmarking 3. Gaming theory	1. Three-year's allowances at one time 2. Historical 3. Benchmarking

Compliance Purpose	Year-by-year	3-year period Year 1: 30% Year 2: 30% Year 3: 40%
Market Adjustment Mechanism	1. Auctioning 2. Price containment reserve 3. Allowance buy-back	1. Auctioning 2. An allowance price containment reserve
MRV	1. Accreditation of verification agencies and verifiers 2. Submitted by hierarchy 3. Report on carbon emissions and statistical index 4. Quarterly and annual report on carbon emissions	1. Approval mechanism for verification agencies 2. Verification depends on emissions 3. 4-year cooperation allowed 4. Avoid the conflict of interest with regulated company 5. Determined by CARB
Offsetting Mechanism	Up to 10% of emissions; CCER	1. 8% usage limit, allowed offsets from US, Canada, and Mexico, and early action offsets 2. Early action offsets are allowed 3. Limited to 2% of a company's total compliance obligation in the first compliance period and 4% of a company's total compliance obligation in the second and third compliance periods
Penalty Rules	1. Forfeit an equal quantity of allowance; 2. Pay a monetary penalty equal to three times the average market price of allowances; 3. Publish notice of criticism through social media and government websites; 4. Report to credit management institutions; 5. Report to Shenzhen Municipal Finance Department to cancel all financial aid and approval of future financial aid applications for five years.	1. Forfeit four times of extra emissions 2. If failing to submit the required amount of allowances 30 days after the penalty comes into effect, they would pay a monetary penalty equal to 25,000 US dollars per unit of exceeded emissions every 45 days.

CHAPTER TWO: PERFORMANCE OF THE SHENZHEN CARBON MARKET

The Shenzhen carbon market has operated for its first full year. During the first compliance period (2013), the ETS succeeded in achieving its expected compliance results, emissions reduction target, economic growth of regulated companies and market transactions.

2.1 Compliance performance

2.1.1 2013 Compliance result

By 1st July 2014, the Shenzhen ETS succeeded in completing its first compliance year. During the first compliance period (2013), 631 out of 635 regulated companies fulfilled their compliance obligation, with a compliance rate of 99.4%.

The four regulated companies which failed to fulfil their compliance obligations by 1st July 2014, still submitted their allowances before the legal due date (10th July) to accomplish their compliance obligations. However, according to the Regulation, these four regulated companies were labelled as non-compliance companies. According to the Regulation, the competent authority took the following actions to penalise the four non-compliance companies: (a) published a notice of criticism through social media and on the government website; (b) reported to credit management institutions, (c) reported to the Shenzhen Municipal Fiscal Department to cancel all financial subsidies and approval of future financial subsidy application for five years. Since these four regulated companies surrendered their allowances before the legal due date (10th July), they were not fined.

2.1.2 Reasons for successful compliance

2.1.2.1 The competent authority attaches great importance to compliance

A demonstrate determination to enforce the law. From May 2014, the competent authority released a notice on the government's official website and social media channels to urge regulated companies to actively participate in compliance. From 13th June 2014, the competent authority released a Notice on the Punishment of Non-Compliant Regulated Companies in the Shenzhen Economic Zone Newspaper for two consecutive weeks. The notice specified the rules, provisions and procedures of punishments for non-compliance, thus dispelling the hesitant and reluctant attitudes of some regulated companies.

Mobilise compliance from local district and street-level administrative agencies. Prior to compliance, the competent authority organised meetings to motivate the regulated companies to fulfil their compliance obligations. The meetings delivered the name list of regulated companies and other relevant information to each district, and called on the sub-district administrative office to proactively disseminate and promote carbon trading and compliance obligations to regulated companies. Each district also established a working team, led by the Deputy Head of the district in order to promote compliance. The working team visited each regulated company and communicated with them the rules and guidelines in accordance with the compliance obligation.

Actively utilise the force of media pressure. The competent authority released the status of compliance via government websites, the website of China Emissions Exchange, and other influential social media in order to exert pressure on the companies that did not fulfil their compliance obligations. After the compliance period,

the competent authority listed the names of regulated companies failing to surrender allowances on time on social media, as well as the names of regulated companies that successfully fulfilled the compliance obligations in time. Therefore, the regulated companies with a positive attitude toward compliance obligations gained public recognition through compliance.

Organised auctioning to help with compliance. The government organised an auction to allow the regulated companies which were short of allowances to make up the shortfall and accomplish their compliance obligation at low cost.

2.1.2.2 Full support from the China Emissions Exchange

Timely reminders on compliance deadline

Prior to compliance, China Emissions Exchange (hereafter referred to as CEEEX) made use of information platforms, such as websites, WeChat and email lists to remind regulated companies off the approaching compliance deadline. CEEEX provided continual reminders for regulated companies to prepare to surrender allowance at an early date.

Carry out training activities on compliance. From the launch of the Shenzhen ETS, CEEEX carried out dozens of training activities for regulated companies. The training topics covered the use of the GHG Information Management System, the use of the Registry, the trading system, and notification on trading rules. When the compliance date approached, CEEEX carried out several training activities on compliance. Nine training courses on compliance were organised between 19th and 21st June 2014. The content included the procedures of compliance, a summary of key dates as well as an introduction to using the trading system.

Extending the daily trading time. In order to provide more trading opportunities for regulated companies, CEEEX extended the daily trading time and temporarily opened the market on the last weekend before the compliance deadline.

2.2 Emissions reduction

2.2.1 Actual total allowances

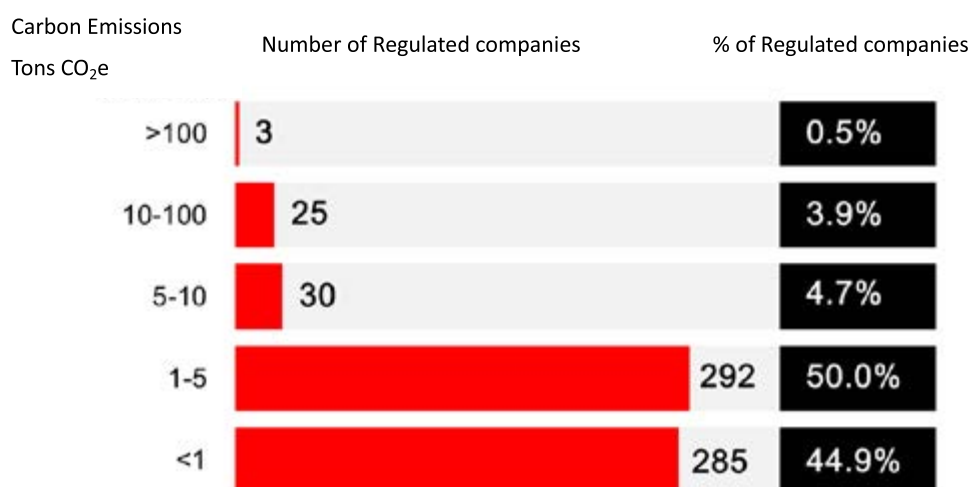
In 2013, the Shenzhen ETS issued 33 million tons of pre-allocated allowances, in which the energy sector accounted for 47%, and non-energy sectors accounted for the rest.

In early 2014, the competent authority adjusted the amount of pre-allocated allowances according to the actual output or industrial value added of regulated companies verified by third party verification agencies. The competent authority then issued actual allowances to regulated companies under the condition of keeping carbon intensity unchanged. According to the above principles, the actual allowances for 2013 consisted of 30.5 million tons in total. This is about 3 million tons lower than the amount of pre-allocated allowances. In other words, the Shenzhen ETS deducted the amount of pre-allocated allowances by 9% after the adjustment.

The reasons are as follows. On the one hand, there was a significant decline in coal-fired power generation in the energy sector. This led to a reduction in the actual amount of allowances. On the other hand, non-energy sectors also saw a small decrease in the actual amount of emissions.

2.2.2 Actual carbon emissions

In 2013, the actual carbon emissions of 635 regulated companies were slightly lower than their total allowances. The following graph shows the distribution of regulated companies based on their carbon emissions: 285 (44.88%) companies emitted less than 10,000 tons CO₂e; 292 (45.98%) companies emitted carbon emissions between 10,000 and 50,000 tons CO₂e; 30 (4.72%) companies emitted carbon emissions between 50,000 and 100,000 tons CO₂e; 25 (3.94%) companies emitted carbon emissions between 100,000 tons and 100 million tons CO₂e; 3 (0.47%) companies emit carbon emissions over 100 million tons CO₂e.



Graph 2.1 Distribution of regulated companies based on carbon emissions in 2013

2.3 Economic growth of regulated companies

In 2013, 621 manufacturing companies covered by the Shenzhen ETS had an industrial value added of CNY351.8 billion, up from 247.6 billion in 2010. This increase of CNY105.1 billion increase corresponds to an increase of 42.5%.

Table 2.1 Analysis of the industrial value added of 621 manufacturing companies

Types of Business	Number	Industrial value added (2010)	% of Industrial value added	Industrial value added (2013)	% of Industrial value added
Communication equipment, computers and other electronic equipment manufacturing	196	1601.083	64.9%	2487.2	70.7%
Machine manufacturing industry, instrument Industry, non - ferrous metal rolling industry	160	328.111	13.3%	341.25	9.7%

Chemical fibre, textile, metal and non-metallic mineral manufactures and rolling industry	162	138.152	5.6%	182.94	5.2%
Paper, printing and chemical products industry	32	39.472	1.6%	45.734	1.3%
Textile, leather, handicrafts and other industries	9	37.005	1.5%	31.662	0.9%
Manufacture of cultural products/items , furniture manufacturing	24	22.203	0.9%	24.626	0.7%
Food, beverage, agro-food industry	24	27.137	1.1%	35.18	1.0%
Pharmaceutical and tobacco industry	9	61.675	2.5%	94.986	2.7%
Others	5	214.629	8.7%	277.92	7.9%
Total	621	-	-	-	-

2.4 Emission reduction achievements and reasons

2.4.1 Emissions reduction achievements

During the first compliance period (2013), the Shenzhen ETS successfully catalysed a reduction in both carbon intensity and carbon emissions overall. In particular, the total amount of emissions for the 635 regulated companies decreased by 3.75 million tons, representing a decrease of 11.5% from 2010. Meanwhile, Shenzhen reduced its carbon intensity by 33.2 percent, finishing the mission set by the “Twelfth Five-year Plan” of a 21% reduction ahead of time. Apparently, the 635 covered companies maintained economic growth while reducing carbon intensity at a faster than expected pace. Shenzhen, therefore, is on the path to low-carbon development, decoupling economic growth from carbon emissions.

Table 2.2 Comparison between 2013 and previous years regarding the decreased rate of carbon emissions and carbon intensity

Base year	Decreased rate of carbon emissions	Decreased rate of carbon intensity
2009	4.27%	32.9%
2010	11.5%	33.2%
2011	12.5%	27.8%

2.4.1 Reasons for emissions reduction achievements

In terms of economic growth and carbon emissions, the Shenzhen ETS succeeded in helping entities achieve emission reductions through energy structure optimisation and industrial transformation. These are two key contributors to the reduction of both total carbon emissions and carbon intensity.

Compared with 2010, eight covered power companies decreased their carbon emissions by 2.95 million tons in 2013. This corresponds to a decline of 18.2%. Meanwhile, their carbon intensity per unit of electricity generated declined by 0.32 ton/kilowatt-hour, equivalent to a decline of 4.6%. The reduction of both the total carbon emissions and carbon intensity is due to two main reasons. First, the proportion of imported electricity has increased. Second, there has been a continuous optimisation of the energy structure. This is shown by a decrease in the proportion of coal-generated electricity and an increase in the proportion of gas-generated electricity. Meanwhile, the proportion of advanced 9F generators increased while the proportion of 9E generators decreased, thus reducing the carbon intensity per gas-electricity generated. In addition, Shenzhen built several new solar PV projects to generate electricity, which increased the proportion of electricity generated from renewable energy.

In 2013, 621 manufacturing companies reduced their carbon emissions by 0.8 million tons, corresponding to a decline of 5.2% compared with 2010. Their industrial value added saw an increase of CNY105.1 billion, an increase of 42.5%. Accordingly, their carbon intensity, declined by 33.2%. In the following table (Table 2.4), communication equipment, computers and other electronic equipment in the manufacturing sector showed a decrease in the proportion of carbon emissions, while experiencing a significant increase in their industrial value added. Their carbon intensity declined sharply, by 39.4%. The proportion of carbon emissions from the machine manufacturing, instruments, and non-ferrous metal rolling sectors stayed about the same, whereas their industrial value added showed a slight decrease. The proportion of carbon emissions from chemical fibres, textiles, metals and non-metallic mineral manufactures and rolling industry sectors increased, whereas their industrial value added suffered from a small decrease. The paper, printing and chemical products sectors as well as textile, leather, handicrafts and other sectors, showed a decreasing trend in both their carbon emissions and industrial added value. In general, within the manufacturing sector, the proportion of low carbon intensity and low energy consumption industries increased, thus promoting a decline in carbon intensity.

The reasons for the decline in GHG emissions and carbon intensity are shown as follows. On the one hand, the industrial transformation and upgrading improved the added value of products, thus largely increasing the industrial added value. On the other hand, the degree of energy saving and emission reduction continues to grow through energy saving reforms, the promotion of advanced energy saving technology, and the elimination or transition of high energy consuming and high emission sectors based on direct fossil fuel consumption. The reform and upgrading of obsolete technology and processes gradually reduce the amount of GHG emissions from the manufacturing sector.

Table 2.3 Analysis of emission reduction achievements by the 621 manufacturing companies

Types of Business	Number	Change in carbon intensity(2013)
Communication equipment, computers and other electronic equipment manufacturing	196	-39.4%
Machine manufacturing industry, instrument industry, non-ferrous metal rolling industry	160	-9.0%
Chemical fibre, textile, metal and non-metallic mineral manufactures and rolling industry	162	-24.1%
Paper, printing and chemical products industry	32	-26.6%
Textile, leather, handicrafts and other industries	9	5.9%

Manufacture of articles for culture, furniture manufacturing	24	-20.4%
Food, beverage, agro-food industry	24	-41.7%
Pharmaceutical and tobacco industry	9	-32.6%
Others	5	-42.4%
Total	621	-33.2%

2.5 Market transaction performance

2.5.1 Primary market - allowance auctions

2.5.1.1 Initial auction

In accordance with the arrangement from the Shenzhen DRC, the CEEX organised an auction in June 2014 for those regulated companies that were short of allowances to make up the shortfall and accomplish their compliance obligation at low cost.

The auction participants were regulated companies which had shortfalls in their 2013 allowances, namely those companies whose actual carbon emissions exceed allocated allowances. Other regulated companies or investors were not allowed to participate. The maximum amount of bidding was not allowed to exceed 15% of the difference between the actual carbon emissions and the actual allowances in 2013. Otherwise, the bidding would be invalid. The allowances won by bidding were directly transferred to the winner's compliance account. The competent authority froze the allowances to guarantee that they are used specifically for the purpose of compliance obligation. The winning bidder is not allowed to trade this part of the allowances in the market.

The auctioned allowances are labelled as 2013 Shenzhen carbon emission allowances (SZA-2013). The total number of auctioned allowances came to 200,000 tons. The reserve price of one ton was set at 35.43 CNY, which was half the average price of allowances since the market launched in June 2013.

During the auction, bidders were only allowed to offer one bid during the process. Even so three bids were allowed in one offer. The total quantity of bids was not allowed to exceed the maximum allowable quantity. Once submitted, bidders could not withdraw their bids.

Regarding the bidding rules, the following was applied: a) if the number of valid bids is greater than or equal to the number of auctioned allowances, the valid bidding prices will be sorted from high to low. The price that fulfils the auction amount is the settlement price; b) if multiple bidders offer a price equal to the bid price, and if the bidding quantities exceed the remaining quantities, the bidding number will firstly be divided by the number of total bidders, then it will be multiplied by the remaining quantity on the basis of the settlement price. c) if the valid bidding quantity is lower than the number of auctioned allowances, the settlement price will be the lowest and valid bidding price.

The successful bidder pays the auction fees in accordance with 5% of the value of the amount of the winning bids. The unsuccessful bidder does not need to pay any auction fee.

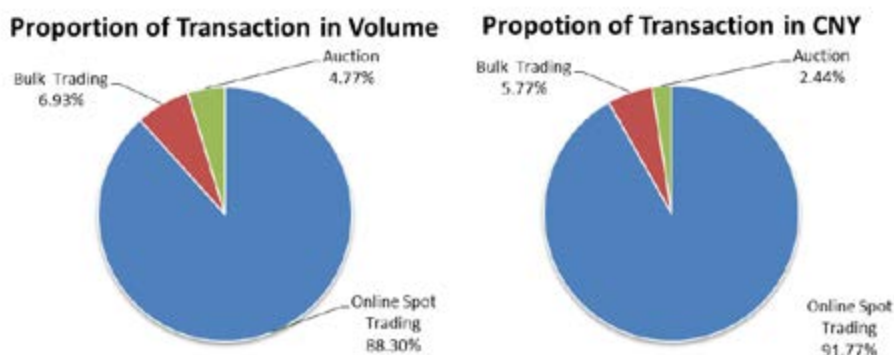
2.5.1.2 Auction results

The auctioning started on June 6 from 9:30 a.m., and lasted for 2 hours. The number of allowances sold amounted to 74,974 tons, accounting for 37.4% of the number of allowances for auction. The auction reserve price was 35.43 CNY per ton. The highest bidding price was 80 CNY per ton. The total turnover was CNY2.65 million. The auction represents a first attempt by the Shenzhen ETS. Overall there were 94 enterprises attending this auction. Only 37% of the allowances were sold, therefore the results were below expectations.

2.5.2 Secondary market - open transactions

2.5.2.1 Trading volumes and turnover

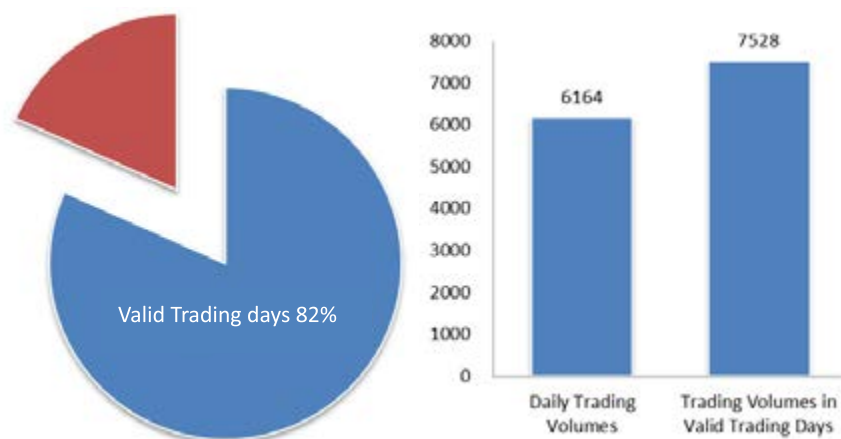
During its first compliance period (from June 18, 2013 to June 30, 2014), the Shenzhen ETS reached a trading volume of 1.57 million tons. The trading value was about CNY109 million. The average trading price was around 69.11 CNY per ton. Of this, the open continuous trading volume was 1.39 million tons and trading turnover was CNY99.77 million; the average price was 71.82 CNY/ton. The bulk trading volume was 110 thousand tons, and the turnover was CNY6.29 million; the average price was 59.88 CNY per ton. The auction volume was 74,974 tons, with turnover of CNY2.65 million, and an average price of CNY35.43 per ton.



Graph 2.2 Proportions of online transactions in value and volume

2.5.2.2 Valid trading days

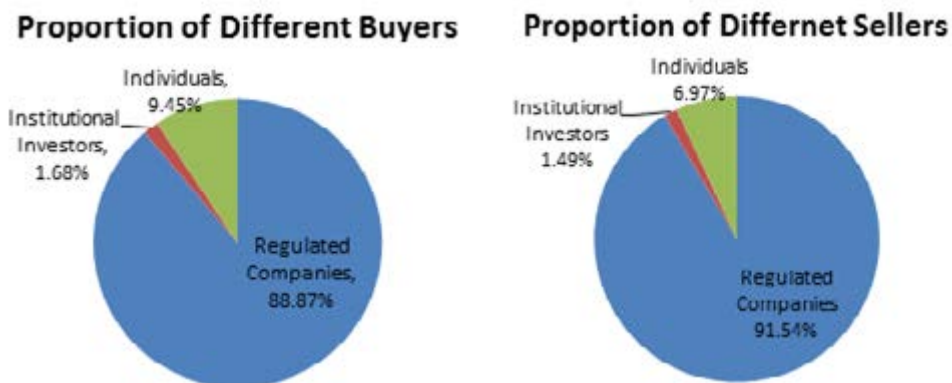
There were 256 trading days in total. The average daily trading volume was 6,146 tons. There were 209 valid trading dates, with an average daily trading volume of 7,528 tons. From September 6 2013 to June 30 2014, the valid trading dates in the Shenzhen ETS reached 195 days. This represents the longest stretch of valid trading days among China's ETS pilots.



Graph 2.3 Daily transactions

2.5.2.3 Market participants

As of June 30, 2014, 635 regulated emitters, 197 buildings, 6 institutional investors, and 640 individual investors hold transaction accounts at the CEEX. Regulated companies purchased 1.33 million tons, and sold 1.37 million tons, accounting for 90.20% of the total transaction volumes. Individual investors purchased 141 thousand tons, and sold 104 thousand tons, accounting for 8.21% of the total transaction volumes. Institutional investors purchased 25,110 tons, and sold 22,402 tons, accounting for 1.59% of the total transaction volumes. Voluntary participants purchased 115 tons, accounting 0.004% of the total transaction volumes.



Graph 2.4 Proportions of Different Market Participants

2.5.2.4 Turnover rate of allowances

The turnover rate refers to the ratio of total allowances gained through transaction. By June 30th 2014, total transaction volumes in the Shenzhen carbon market amounted to 1.57 million tons. This amount was third among the pilot schemes, lower only than the transactions in Hubei and Beijing (1.61 million tons). Nevertheless, Shenzhen carbon market has clearly the highest turnover rate (5.24%) regarding the ratio of transactions to the total amount.

Table 2.4 Ratio between the transaction amount and the total amount of allowances on June 30th 2014

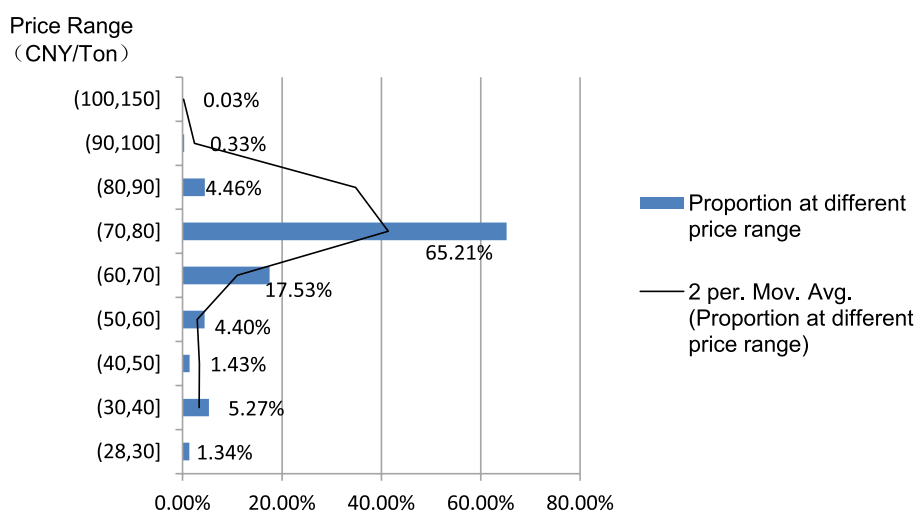
Carbon Market	Transaction Amount	Total Amount	%
Shenzhen	157.33	3000	5.24%
Shanghai	155.34	16000	0.97%
Beijing	161.11	5000	3.22%
Tianjin	20.08	16000	0.12%
Guangdong	57.80	38800	0.15%
Hubei	404.90	32400	1.25%

2.5.2.5 Price range of allowances

In the first compliance period, Shenzhen developed a complete price curve within the carbon market. On the one hand, it encouraged regulated companies to fulfil their compliance obligation at the lowest cost via market mechanism. On the other hand, the price curve could be used as a reference for investment decisions.

Table 2.5 Proportion and price range of allowance transactions by June 30th, 2014

Price Range	Volume	Proportion
(28, 30]	21,102	1.34%
(30, 40]	82,984	5.27%
(40, 50]	22,500	1.43%
(50, 60]	69,215	4.40%
(60, 70]	275,757	17.53%
(70, 80]	1,025,903	65.21%
(80, 90]	70,176	4.46%
(90, 100]	5,141	0.33%
(100, 150]	522	0.03%



Graph 2.5 Proportions and price range of allowance transactions by June 30th, 2014

As can be seen from Table 2.5 and 2.6, 87% of the transactions fall mainly in the price range of 60 to 90 CNY by June 30th 2014. 65% fall in the price range of 70 to 80 CNY. In June 2014, the percentage of transactions falling in the price range of 80 to 90 CNY declined significantly from 25% to 4.5%. Auctioning was the main contributor to the transactions falling to the price range of 30 to 40 CNY whereas bulk trading is mainly responsible for transactions falling within the price range of 50 to 60 CNY. According to the electronic trading platform, the Shenzhen carbon market to date has had a minimum price of 28 CNY and a maximum price of 143 CNY.

2.5.2.6 Reasons for allowance price fluctuation



Graph 2.6 Trends of average price and volume in Shenzhen ETS (2013.6.18-2014.6.30)

With the help of open bidding and the electronic trading platform with a range of market participants, the Shenzhen carbon market has demonstrated the capability for price discovery in the first compliance period, according to expectations. Initially, from the time of the launch of the market until mid-December 2013, the market experienced a period of price discovery. During this period, a lack of historical price data as a reference meant that price volatility was more intense.

The main reasons for price fluctuation after December 20th, 2013 were as follows.

At the end of December 2013, the allowance price was in a slump, reaching a minimum of 60 CNY/ton, caused by requirements to give the appearance of increased performance in annual financial statements. A lot of allowances were sold to the market, leading to a significant price decline due to oversupply.

The price started to rise from mid-February, and remained stable till mid-April. Regulated companies started to pay great attention to compliance obligations from February. Some companies with a shortfall in allowances had started to purchase allowances from the market, leading to a price rise. The price finally stabilised at 80-90 CNY/ton.

In late April 2014, the price decreased significantly. The main reason is that after verification, some companies realised that they owned excessive allowances. Selling of some of these carbon assets, led to a price decrease from 90 CNY/ton to 60 CNY/ton.

May and June were the last two months before compliance. They were also the two months with the largest transaction volumes. The price remained stable at 60-70 CNY/ton, Suggesting that this price range to some extent accurately reflected compliance costs.

At the end of June the price declined. The main reason is that some companies which participated in the carbon market finally sold excess allowances after finishing their internal approval process. Regulated companies with a shortage of allowances purchased the required allowances so as to avoid penalties. At that moment, demand was greater than supply, leading to a decrease in the price. After the compliance deadline (June 30th 2014), there were 1 million tons of SZA-2013 available in the secondary market, demonstrating a slight surplus of SZA-2013.



Graph 2.7 K-line in Shenzhen carbon market

CHAPTER THREE: EXPERIENCE FROM THE FIRST YEAR OF OPERATION

Shenzhen ETS is the domestic ETS with the longest operational period in China. Therefore the annual summary on its first operation year is especially significant. It is necessary to conduct in-depth research on all stakeholders of the Shenzhen ETS by fully listening their comments and suggestions in order to thoroughly evaluate the experiences and problems emerging from the first year of operation.

3.1 Feedback and comments of Shenzhen ETS stakeholders

3.1.1 Stakeholder survey

The project team designed targeted questionnaires for different stakeholders. The stakeholders are divided into eight groups, including the national competent authority, the municipal competent authority, other government departments, regulated companies, domestic and international research institutions on emissions trading, carbon asset management companies, financial institutions, third party verification bodies and investors. In addition to inviting regulated companies to fill in the questionnaire online, the project team conducted face-to-face interviews with a total of 40 representatives of other stakeholders. Moreover, the project team visited 30 regulated companies, from which it chose representative enterprises to formulate case studies. The regulated companies can gain valuable experience from these case studies in order to improve their carbon assets management and trading. The composition of all stakeholders is shown in Table 3.1.

Table 3.1 Composition of samples

Types of Stakeholder	Total Number in Survey	Samples Recovery	Effective Samples
National Competent Authority	1	1	1
Municipal Competent Authority and Other Government Department	3	3	3
Regulated Companies	635	98	98
Research Institutions	2	2	2
Carbon Assets Management Companies	2	2	2
Financial Institutions	2	2	2
Third Party Verification Bodies	3	3	3
Investors	4	4	4
Investors	1	1	1

3.1.2. Key feedback from government departments

3.1.2.1 Shenzhen ETS received satisfactory results from its first year of operation

Strictly enforced the law to ensure compliance. Shenzhen strictly enforced the ETS law during the compliance period. Shenzhen kept the compliance date unchanged and made the full use of media to disseminate information about penalty rules, dispelling the hesitant and reluctant attitudes of some regulated companies. These measures effectively guaranteed the high level of compliance in the Shenzhen ETS. The Shenzhen ETS pilot became one of only two pilots which did not defer the compliance deadline.

Compliance results were beyond expectation. By July 1st, 2014, 631 out of 635 regulated companies in the Shenzhen ETS successfully surrendered their allowances and fulfilled their compliance obligations on time. This was the highest rate among the seven pilot ETSs. The compliance rate of the companies reached 99.4%, while the compliance rate of allowances reached 99.7%. This makes Shenzhen's compliance results very close to, or even equal to that of the international carbon market.

Regulated companies achieved outstanding emission reductions. During the first compliance period (2013), the Shenzhen ETS successfully catalysed a reduction in both carbon intensity target and absolute emissions. In particular, the total amount of greenhouse gas emissions for 635 regulated companies decreased by 3.75 million tons. This corresponds to a decline of 11.5% between 2011 and 2013 (the total amount was 33.64 million tons in 2011, and 29.94 million tons in 2013). Meanwhile 621 regulated emitters in Shenzhen decreased their carbon intensity by 33.2%, accomplishing the mission set by 'the 12th Five-Year Plan' of a 21% reduction ahead of time.

Regulated companies achieved impressive economic growth. In 2013, the total amount of electricity generated from 8 power companies was around 20 billion kilowatts. Water supply plants generated around 1 billion cubic meter. Gas plants generated around 6 million tons of natural gas. Glass factories generated over 0.3 million tons of glass. Meanwhile, 621 manufacturing companies covered by the Shenzhen ETS had an industrial value added of CNY351.8 billion, corresponding to a CNY105.1 billion increase from 2010, or 42.5%.

The Shenzhen ETS became a functioning market mechanism. Shenzhen's carbon market is a leader in terms of liquidity. Firstly, the Shenzhen ETS is not only open for domestic individual investors and institutional investors, but also for oversea investors. In this way it is increasing the diversity of investors. Secondly, while accounting for 2.5% of allowances of all the pilots, the Shenzhen ETS accomplished 12.6% of the overall trading volumes as well as 22.9% of turnover in its first compliance year. Shenzhen was also the first carbon market to break CNY100 million of trading value. Thirdly, the turnover rate is 5.24%, much higher than in the other ETS pilots. Fourthly, Shenzhen has a large number of effective trading days. By the end of the compliance period, the Shenzhen carbon market had 256 official trading days, 209 of which saw effective trading. Thus the market function of the Shenzhen ETS can be considered as having emerged through the forming of a relatively complete price curve as well as providing preliminary and effective decision-making information to the market participants.

3.1.2.2 Highlights of the Shenzhen ETS include its openness and innovation

Design Innovation

Shenzhen created a dual adjustable caps, an allowance allocation mechanism based on dynamic game theory, a sophisticated market adjustment mechanism, and MRV with diversified monitoring reports. Furthermore, it sets strict penalties on regulated companies not fulfilling their compliance obligations. These features have in turn been adopted by some other pilot regions.

Legalisation Innovation

In October 2012, the Standing Committee of Shenzhen People's Congress passed the Provisions, which represents China's first local law specifically on GHG emissions management. It has been voted as one of nine highlights of global climate change legislation by the Global Legislators Organisation (GLOBE). In March 2014, Shenzhen Municipal Government published the Regulation, which stands out among the administrative measures of other pilots due to its length and depth of content.

Market Innovation

Shenzhen carbon market was the first domestic market that opened to individual investors and institutional investors. On August 8th, 2014, it became the first carbon market to open to foreign investors. To date, it is the domestic carbon market with the largest number of members and clients, as well as the highest turnover ratio of allowances.

Financial Innovation

Shenzhen carbon market is the only carbon trading partner of the International Finance Corporation of the World Bank in China as well as China's leader in carbon financial innovation. Its key achievements include succeeding in making the following financial innovations possible: issuing the first carbon bond, launching the first carbon fund, starting the carbon pledge, as well as performing a structured deposit of allowances. It is also actively involved in the in-depth research and exploration of other innovative trading products.

3.1.2.3 The Shenzhen ETS has contributed to the establishment of the domestic carbon market

The Shenzhen ETS can bring the following four lessons to the development of a nationwide ETS. The first is to provide strong guidance on the design of a national ETS, to formulate nationwide policies on curbing greenhouse gas emissions, as well as to promote the progress of carbon trading legislation, providing a clear direction on the development of China's national carbon market. The second is to enhance the details of the structural design of the ETS. This is an important point of distinction between the national carbon market and the pilots. The national government will need to issue relevant guidelines and solutions regarding technical issues. The third is to promote an open and genuine market, rather than a closed and false market. The last is to strengthen a full range of capacity building, from policy makers to regulated companies, verification bodies, and market investors.

3.1.2.4 Work to promote the development of the Shenzhen ETS

The future development of the Shenzhen ETS mainly focuses on the following three areas. The first is to expand the scope and coverage. Shenzhen shall continue expanding the number of regulated companies from the industrial sector. 500 new entrants are currently undergoing a process of historical emissions data verification. Shenzhen will also gradually incorporate the transportation sector into the ETS. Currently, public transport and taxi companies are already being incorporated into the ETS in accordance with the standard and procedure for industrial companies. The progress to incorporate private automobiles into the ETS is under discussion. The second is to accelerate the improvement of rules and guidelines on emissions trading. In other words, Shenzhen shall develop supporting rules and measures associated with the Regulation. Shenzhen shall also issue guidelines, standards and rules for the transportation sector. The third is to develop a regional carbon market. Shenzhen shall develop a regional carbon market with other provinces which are willing to participate in the ETS, and help other provinces regarding capacity building so as to explore the path towards a national carbon market.

3.1.3. Key feedback from domestic and international research institutions on carbon trading

The project team conducted face-to-face interviews with three domestic and international research institutions on carbon trading. Their key views on the Shenzhen ETS are as follows.

First, all agree that the first year of operation of the Shenzhen ETS was successful.

Second, they all share the opinion that the most successful design components in the Shenzhen ETS are the legislation, compliance mechanism, and cap setting, in that order.

Third, all consider Shenzhen's features of innovation and openness as an advantage while the scale of allowances are seen as a disadvantage.

Forth, they suggest that the Shenzhen ETS should improve information transparency regarding the methodology protocol and procedures for free allowance allocation, as well as the annual GHG emissions of each regulated company.

Fifth, they all support Shenzhen in further exploring carbon financial products, and believe that such products could improve the liquidity of the secondary market.

3.1.4 Key feedback from carbon asset management companies

The project team interviewed two Shenzhen carbon asset management companies, both of whom are private enterprises. The size of staff of these two companies ranges from a dozen to two dozens employees. In addition to providing services to the Shenzhen carbon market, they also provide services to other pilots. Their views on the Shenzhen ETS are as follows.

3.1.4.1 Sound business environment and moderate supervision

The Shenzhen carbon market offers a sound business environment since the level of competitors is quite close and the market itself is relatively fair and equitable. They support encouraging market competition among carbon asset management companies according to the principle of survival of the fittest.

3.1.4.2 Small scale and limited business volume

All carbon asset management companies consider the scale of allowances to be small, thus the business volume is limited. Since all the pilots are lacking in liquidity, interviewees worried that the national carbon market could face the same problem.

3.1.4.3 Wide variety of factors affecting profitability

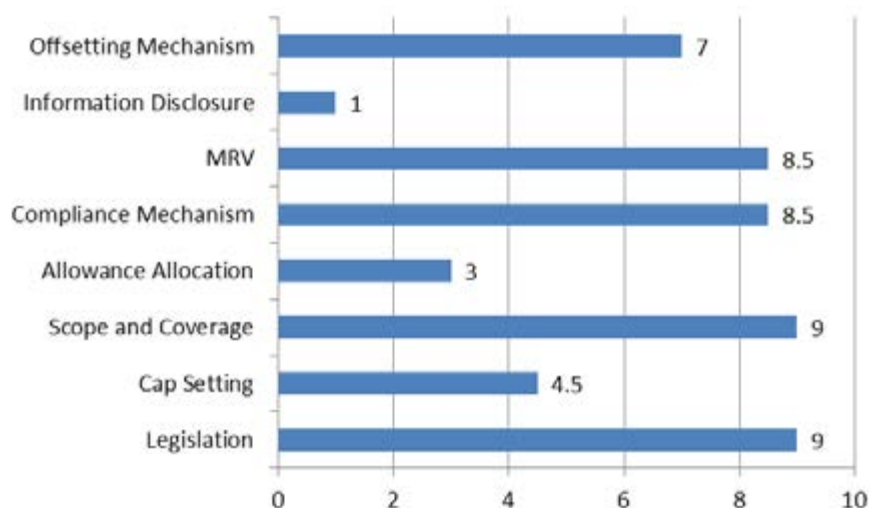
There are a wide variety of factors affecting the profit outlook. Ranked by importance, the first is that regulated companies lack awareness in carbon asset management and lack confidence to invest much. The second is that the carbon market is not liquid and the trading products are only spot products. The last is that the government support for carbon asset management companies is insufficient.

3.1.4.4 Future business types

Currently, the main services provided by carbon asset management companies include carbon funds, low-carbon training, carbon auditing, consulting services on energy management contracts (EMC), CCER development, brokerage on carbon trading accounts, GHGs verification etc. Carbon asset management companies consider that their future income is mainly dependent on the custody of carbon assets and the operation of carbon funds. Carbon asset project development (CDM, CCER, VER etc.) will face fierce competition in the future, in other words the profit margin will be small and the future prospects do not seem very optimistic.

3.1.4.5 Comments on the core components of the Shenzhen ETS

The respondents scored the design components of the Shenzhen ETS with scores ranging from 0 to 10, where 10 represents the highest score. According to the rating of the carbon assets management companies, the four components with the highest scores are the ETS legislation, coverage and scope, the compliance mechanism and MRV. The three components with the lowest scores are information disclosure, allowance allocation approach, and cap setting.



Graph 3.1 Scores on the design components of Shenzhen ETS from carbon asset management companies

3.1.4.6 Improvements to the Shenzhen ETS

The interviewees consider that the dual control of both carbon emissions and carbon intensity brings high management costs to the regulated companies. There is also a conflict in the accuracy of the industrial value added. Therefore, the Shenzhen ETS is expected to be further simplified in the future. The carbon asset management companies suggest that the industrial value added should be submitted directly to the competent authority by the Municipal Bureau of Statistics in order to ease the burden on regulated companies. They also suggest improvements to increase certainty in the market and improve trading efficiency and liquidity. Moreover, they suggest enhancing information disclosure to help investors make appropriate investment decisions.

3.1.5 Key feedback from third party verification bodies

The project team conducted surveys with three third-party verification bodies. Currently, Shenzhen has 21 recorded third-party verification bodies, as well as 413 recorded verifiers affiliated to verification bodies. The third-party verification bodies are mainly private companies, and differ in number of employees, ranging from dozens of employees to thousands of employees. Their main businesses include providing services on ISO related certificates and trainings. Their views on the Shenzhen ETS are described here.

3.1.5.1 Profits from the carbon verification business are low

The verification of GHG emissions accounts for a small proportion of the total business of the verification bodies.

At the same time it promotes other business, such as GHG-related trainings. 67% of the interviewees said that although the workload of verification has increased, profits are still low due to fierce market competition. 33% of them consider the workload as sufficient.

3.1.5.2 The government should pay for verification fees

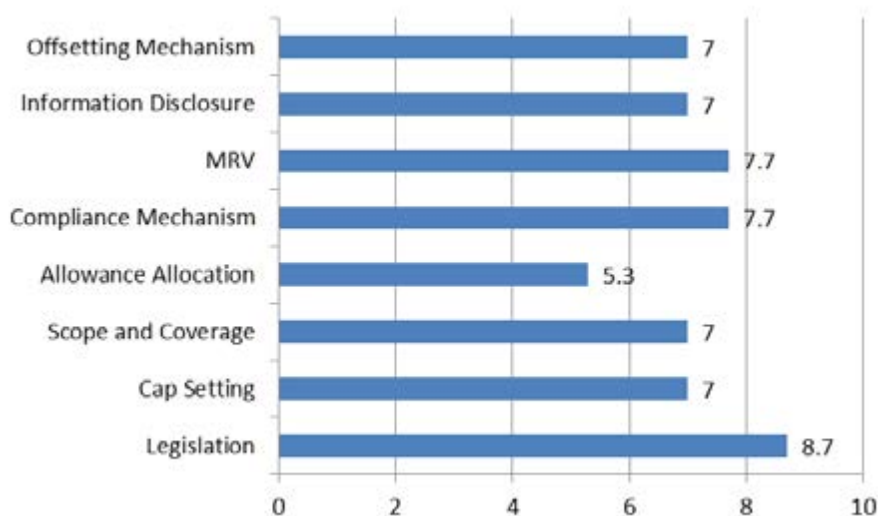
Third-party verification bodies believe that if the government assigns the verification business of regulated companies to the verification bodies in accordance with their qualification and size, and pays the verification fees instead of the regulated companies, the quality of verification would increase.

3.1.5.3 The market environment needs improvement

According to the respondents, one considered that the market environment for verification is not ideal, technical skill levels are uneven and there is excessive competition. The remaining two consider that the market environment is poor, skill levels vary considerably, and competition substantially unfair. Therefore, they suggest the government issue policy guidance on verification for reasonable competition among the verification bodies.

3.1.5.4 Comments on the core elements of the Shenzhen ETS

The respondents score the design elements of the Shenzhen ETS in order of quality as follows: the ETS legislation, coverage and scope, the compliance mechanism and MRV.



Graph 3.2 Average scores on the design elements of the Shenzhen ETS from third -party verification bodies

3.1.6 Key feedback from financial institutions

The project team surveyed two banks that were deeply involved in the Shenzhen ETS. In addition to the Shenzhen ETS, these two banks also provide services to other pilots. Currently, their main business includes settlement service on carbon trading, brokerage on account opening, and carbon pledges. For the following three years, both banks show a positive attitude and plans to introduce carbon funds, carbon asset management service, and carbon trading consulting service. Their views on Shenzhen ETS are described below.

3.1.6.1 Satisfied with the environment and opportunities of the Shenzhen carbon market

The main drivers in carbon trading business for banks is their optimistic view on the future development of the carbon market and the position of green finance business. Both financial institutions are satisfied with the achievements of the Shenzhen carbon market, and consider the Shenzhen carbon market as providing them with a sound market environment and sufficient business opportunities.

3.1.6.2 Success and weakness

Both banks consider the most successful elements in the Shenzhen ETS as being the legislation and offsetting mechanism. In their view a key weakness lies in the level of information disclosure.

3.1.6.3 The biggest problem is market liquidity

Both banks agree that the biggest challenge is the lack of liquidity of the market. They also note that the traded products currently only consist of spot products. Under this condition, the benefits from investment cannot cover costs.

3.1.6.4 Call for support for carbon finance from government

Both banks hope for more support from the government regarding carbon finance. They agree on the desirability of the establishment of a unified carbon market, and setting unified guidelines and rules for the carbon market. They also suggest the development of carbon finance derivatives to activate the carbon market, as well as the issuance of supportive rules on energy saving. They also suggest enhancing the supervision of the carbon market.

3.1.6.5 Positive attitudes towards a national carbon market

Both financial institutions have seen the huge potential and future opportunities from a national carbon market. Both banks express continuous interest in this field and plan to promote financial innovation in accordance with national policies to maintain their leading position in carbon trading.

3.1.7 Key feedback from investors

The project team had interviews with four investors in the Shenzhen carbon market, including two individual investors and two institutional investors. Their views on the Shenzhen ETS are shown as follows.

3.1.7.1 Views on the design of Shenzhen ETS

The investors expressed that confidence in participation in the carbon market could be affected by the allowance allocation approach, offsetting mechanisms, compliance mechanisms, legislation, the scope and coverage as well as information disclosure mechanisms. The Shenzhen ETS needs further improvement in its trading model and information disclosure. More specifically, many investors consider that the delivery requirement of T+5 affects their trading frequency.

3.1.7.2 Improve the degree of information disclosure and the channels to access it

The institutional investors expect to gain more information on the emissions of regulated companies. This information could better assist them in understanding the needs for carbon asset management. They also hope

that they could have face-to-face communication with regulated companies to further understand how to manage carbon assets.

The individual investors are willing to adopt the trend on the rules and guidelines associated with energy saving, emission reduction and carbon trading because the trends would affect the carbon price as well as decision making. Individual investors also want to receive more information via SMS and seminars/workshops to understand the trends of the carbon market more quickly and to make early investment decisions.

3.1.7.3 Comments on the Shenzhen carbon market


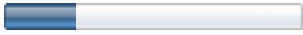
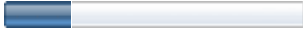
The scores from most investors on the Shenzhen carbon market are higher than 80%, showing that investors have a positive attitude towards the operation and future of the carbon market. Furthermore they are willing to conduct long-term and continuous investments in the Shenzhen carbon market.

3.1.8 Key feedback from regulated companies

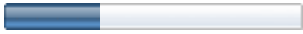
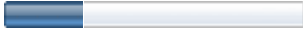
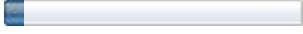
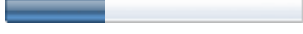
The project team sent online questionnaires to all regulated companies, and received a total of 98 valid responses. Among them, over half are wholly foreign owned enterprises. Chinese-foreign joint enterprises and private enterprises account for around 10% each.

3.1.8.1 Internal carbon asset management

Over half of the respondents have full-time employees in carbon asset management, but still 24% of them neither have nor plan to have full-time employees in carbon asset management. 33% of the respondents have set up a department specialised in carbon asset management; 33% have not done so but have full-time employees dedicated to carbon asset management. 7% plan to set up a department specialising in carbon asset management, and 26% have no plan to do so.

Options	Proportion
Have done	 53.06%
Have not done but have plan	 24.49%
Have not done and no plan	 22.45%

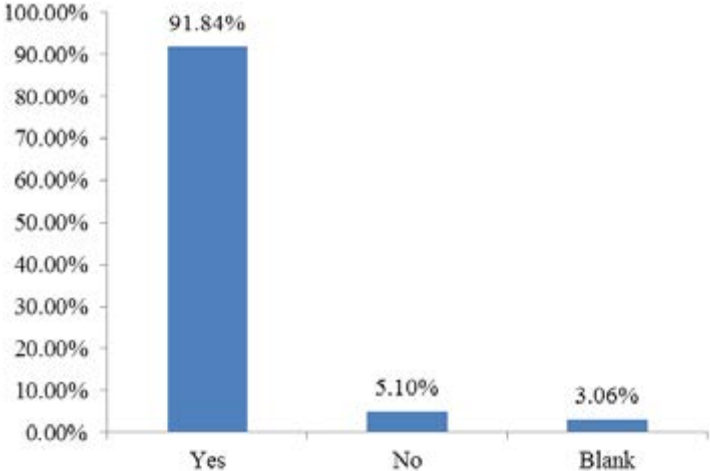
Graph 3.3 Full-time staff in carbon asset management

Options	Proportion
Have done	 32.65%
Have not yet but plan to	 26.53%
Have not and do not plan to	 7.14%
Have not, but do have staff	 33.67%

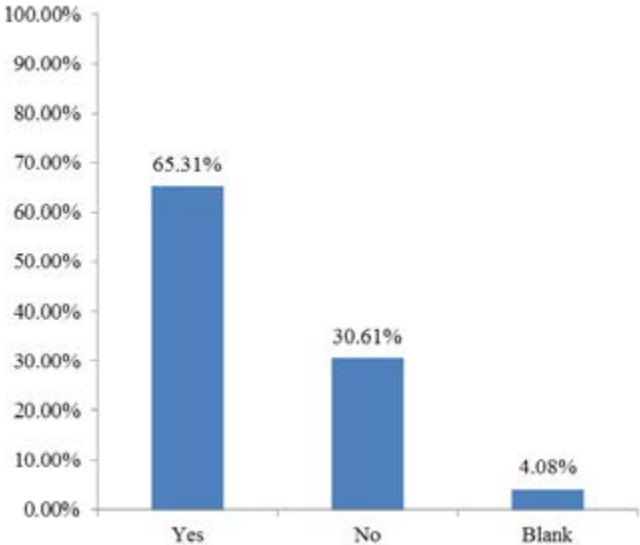
Graph 3.4 Departments specialising in carbon asset management

3.1.8.2 Energy saving and emission reduction activities

92% of the respondents carry out energy saving and emission reduction activities annually; 65% of the respondents carry out energy saving and emission reduction activities with the purpose to accomplish a carbon trading target.



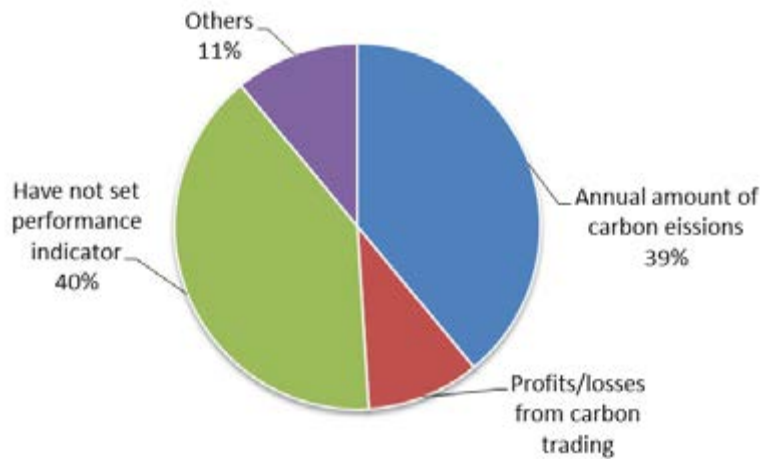
Graph 3.5 Proportion of companies that carry out annual energy saving and emission reduction activities



Graph 3.6 Proportion of companies that carry out annual energy saving and emission reduction activities in order to accomplish a carbon trading target

3.1.8.3 KPI on carbon asset management

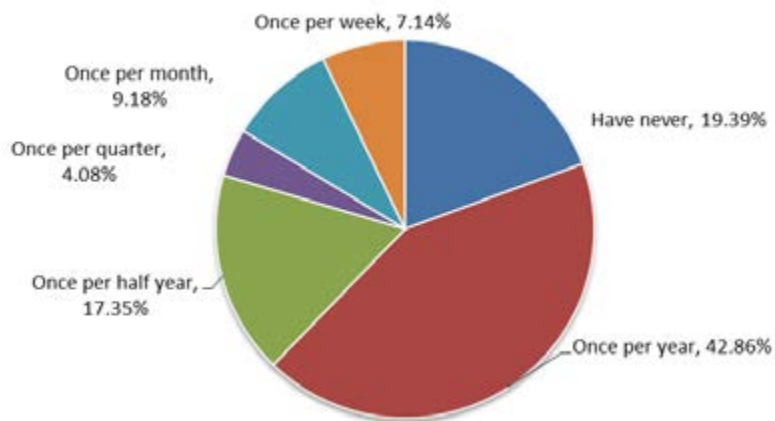
40% of the respondents have not set a KPI specific to carbon asset management; 39% have set the total amount of annual carbon emissions as a KPI; over 10% have chosen the profit or loss form annual carbon trading as a KPI.



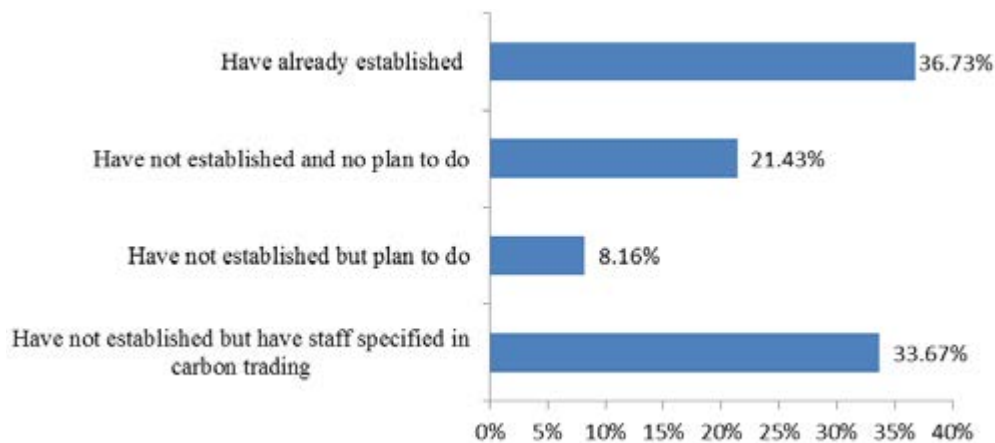
Graph 3.7 KPI for carbon assets management

3.1.8.4 Transaction frequency in the carbon market

19% of the respondents have never participated in carbon trading; 43% of them participate in carbon trading once per year; 17% participate in carbon trading every half year, showing that the transaction frequency in the carbon market is still low. However, although the frequency of trading in the carbon market is not high, 37% of them have established complete internal authorisation on carbon trading, and 34% of them have not set but plan to set staff specified for carbon trading.



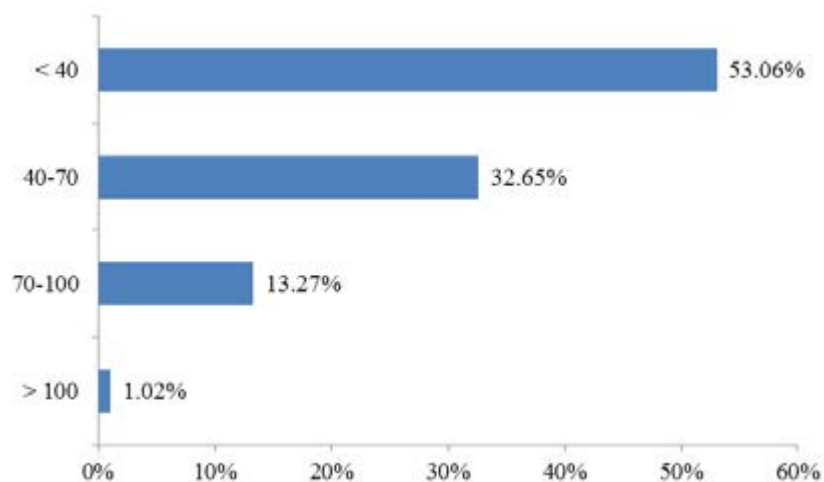
Graph 3.8 Trading frequency by regulated companies



Graph 3.9 Establishment of complete internal authorization mechanism to participate in carbon trading

3.1.8.5 Perceived appropriate price range of allowances

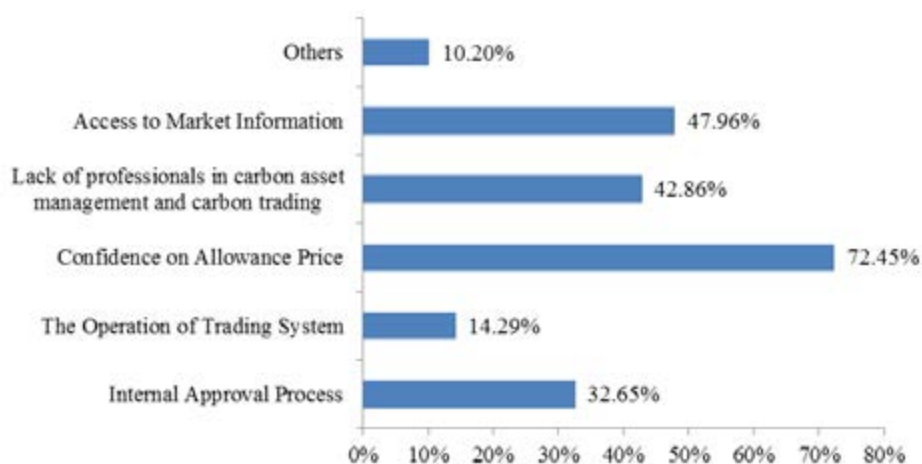
53% of the respondents think the price of allowances should be lower than 40 CNY; 32% of them think the reasonable price range should be between 40 and 70 CNY; 14% think the price should be higher than 70 CNY. Considering that the respondents include companies with both a shortage and surplus in allowances, the result reflect the expectations of both buyers and sellers.



Graph 3.10 Perceived appropriate price range of allowances

3.1.8.6 Challenges to participating in carbon trading

The challenges faced by enterprises to participate in carbon trading, ranked from highest to lowest in accordance with the degree of difficulties are as follows: inability to forecast allowance price, insufficient information from the market, lack of professionals in carbon asset management and carbon trading, difficult procedures on internal approval, as well as unskilled operation in the trading system.



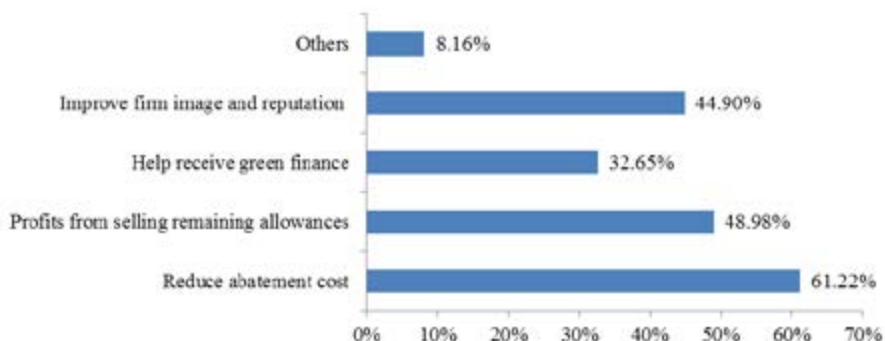
Graph 3.11 Challenges to participate in carbon trading

3.1.8.7 Comments on the Shenzhen carbon market


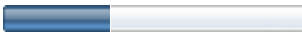

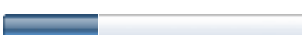
Most regulated companies have a supportive attitude towards carbon trading, and believe that carbon trading can reduce their abatement cost, help them to make profit from selling surplus allowances, improve their image and reputation as well as help them to receive green finance.

Among the eight design elements of the Shenzhen carbon market (legislation, cap setting, scope and coverage, allowance allocation approach, compliance mechanism, MRV, information disclosure, and offsetting mechanism), regulated companies are most satisfied with legislation (34.69%), cap setting (24.49%), and offsetting mechanism (11.22%). Around 44% of the regulated companies think the allowance allocation approach is somewhat difficult. In addition, 15.31% of the regulated companies suggest enforcing the establishment of an information disclosure mechanism to protect the reasonable interests and rights of market participants.

Regulated companies hold different opinions on the submission of emissions reports each quarter. Half of the respondents think that it helps the company to develop their energy saving and emission reduction strategy as well as to manage the allowances. The remainder consider the reports as extra workload.



Graph 3.12 Benefits from carbon trading

Option	Proportion
Help the compliance company develop energy saving and emission reduction strategy	 48.98%
Manage the allowances and achieve breakeven point	 35.71%
Increase workload for administrative officers	 58.16%
Inconvenient operation in GHGs Information Management System	 31.63%

Graph 3.13 Companies' attitudes towards the submission of quarterly emissions reports

3.2 Successful experiences from the Shenzhen ETS

This section summarises the successful experiences of the Shenzhen ETS in its first year of operation by referring to research on the Shenzhen carbon market, deep analysis of the market's performance, as well as consideration about the future direction of the Shenzhen carbon market and the move towards a national carbon market.

3.2.1 Create resilient laws and strict enforcement

Following the design principle of "legislation first", Shenzhen created a sound legal basis for the development and smooth operation of the Shenzhen ETS.

3.2.1.1 Legislation from the Shenzhen People's Congress

In October 2012, the Standing Committee of Shenzhen People's Congress passed the Provisions, which was China's first local law specifically relating to GHG emissions management. It was voted as one of nine highlights of global climate change legislation by the Global Legislators Alliance (GLOBE). The Provisions set down the principle rules for carbon trading such as the cap setting, allowance management, GHG emissions reporting, emissions trading mechanism, offsetting mechanism and penalties for excess emissions.

3.2.1.2 Local rules on carbon trading

In March 2014, Shenzhen Municipal Government published the Regulation, which stands out among the administrative measures of other regions due to its length and depth of contents which refines the Provisions and details the specific rules and guidelines on emissions trading.

3.2.1.3 Normative documents from government departments

The Shenzhen MSC issued two key documents: the Notice on Guidance for Quantification and Reporting of Organizational Greenhouse Gas Emissions and the Notice on Guidance for Verification of Organizational Greenhouse Gas Emissions, which together specify the principles and requirements for GHG emissions measuring, reporting and verification and were implemented from December 1st 2012. On May 21st 2014, the Shenzhen DRC and Shenzhen MSC issued the Administrative Measures on Third-Party Verification Bodies and Verifiers, providing the legal basis for regulating third-party verification bodies.

3.2.1.4 Rules and supportive measures on carbon trading

In 2013 and 2014, CEEEX announced rules on spot trading, member management, risk control and management, brokerage members, custodian members, abnormal circumstances and penalties for illegal acts etc.. They provided comprehensive trading rules and regulations for market players in the Shenzhen carbon market.

Shenzhen not only established a strong legal basis for ETS, but also enforces laws strictly during its operation, thus supporting the success of the scheme in its first year of operation.

3.2.2 Forging synergy between multiple government departments

Effectively integrating and utilising the force of multiple government departments and from all sectors of the community has been a significant contributor to the successful development and operation of the Shenzhen ETS.

3.2.2.1 Municipal government attaches great importance to ETS and works closely with relevant government department

The establishment of the Shenzhen ETS could not happen without the leadership of the Shenzhen municipal government. Shenzhen's government has attached great importance to the ETS and established the Shenzhen ETS Leading Group to direct work. The government also set up a specific division – the Shenzhen ETS Office – which is in charge of the establishment of the Shenzhen ETS under the Shenzhen DRC. Its key responsibilities are to implement and promote the ETS pilot and to conduct the day-to-day work, relying on relevant professional organisations.

More specifically, the Legislative Affairs Office of Shenzhen's municipal government pushed the legislation for emissions trading. The Foreign Exchange Bureau of Shenzhen and the People's Bank of China Shenzhen Branch promoted the Shenzhen ETS to be the first domestic carbon market that allows participants from overseas to trade in Shenzhen with foreign currency or overseas RMB. The Shenzhen Market Supervision Bureau issued guidelines for MRV and regulation of third-party verification bodies. The Shenzhen Municipal Statistics Bureau verifies the statistical data submitted by the regulated companies. The District Departments and other functional departments such as the Finance Bureau, the Transport Bureau and the Water Supply Bureau, support the emissions trading scheme within their respective areas of responsibility.

3.2.2.2 Full support from Shenzhen's supporting institutions

The design of the Shenzhen ETS integrates human talent from several organisations. The Shenzhen Research Centre for Urban Development, the China Emissions Exchange, and the Shenzhen Institute of Environmental Science worked together to complete the Shenzhen city inventory. The Peking University Shenzhen Graduate School, Tsinghua University Shenzhen Graduate School, Shenzhen University, Shenzhen Architectural Scientific Research Institute and other organisations participated in the cap setting and allowance allocation. 19 third-party verification bodies conducted verification of the historical carbon emissions for around 800 companies. Accounting firms verified the industrial value added of 621 regulated companies from the manufacturing sector.

3.2.2.3 Support from international organisations

The development and implementation of the Shenzhen ETS received valuable support from international organisations. In particular, GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) and the Embassy of the United Kingdom provided Shenzhen with experience regarding the design, administration, and operation of the EU ETS. EDF organised several seminars/workshops on the Shenzhen emissions trading scheme, and provided

valuable comments. IETA organised the ‘Business Partnership for Market Readiness’, a training workshop with the clear objective to support the development of good business practices in the operation and design of market based instruments to reduce GHGs. The World Bank and IFC assisted Shenzhen in implementing innovative research on carbon financial products.

3.2.3 The innovative character of Shenzhen

As a city-wide ETS, the Shenzhen ETS has its own drawbacks, such as the small size of total allowances, the light industrial structure, few large emission sources (steel, cement, paper, and metal smelting etc.). Therefore, Shenzhen presents a very innovative and unique ETS.

3.2.3.1 Positive cooperation with international carbon markets

Along with the growing pressure regarding international emissions reduction, a gradual deepening of cooperation among countries is taking place regarding emissions reduction and the development of international carbon markets. Close cooperation is therefore essential and unavoidable. The establishment of the EU ETS and the linkage between California and Quebec are role models for international cooperation in tackling climate change. As the first ETS pilot launched in China, Shenzhen attaches great importance to international cooperation, and has signed a MOU with the California ETS. In September 2014, Shenzhen had active exchange with California and Quebec on carbon trading cooperation, and agreed on cooperation and research on carbon trading in public transportation with California.

3.2.3.2 Relatively sophisticated market adjustment mechanism

In order to stabilise the carbon price and safeguard an orderly carbon market, Shenzhen boldly created a relatively sophisticated market adjustment mechanism, including the selling of allowances at fixed price, as well as an allowance buy-back mechanism. These two mechanisms, on one hand emphasise moderate regulation of the market; on the other hand, it sets constraints on market intervention by the government, such as the intensity, frequency, and objectives of intervention to avoid market failure from excessive government intervention. Well-rounded and multi-layered carbon market adjustment mechanisms not only restrain excessively high prices from arbitrage, but also avoid damage to market participants due to excessively low prices. In other words, market adjustment mechanisms can balance the demand with supply and stabilise the market price.

3.2.3.3 Actively involved individual investors

Shenzhen carbon market was the first carbon market in China to open to individual investors. It has been shown that individual investors play an important role in boosting the liquidity of the Shenzhen carbon market. Tianjin, Hubei and Guangdong adopted this strategy from Shenzhen and subsequently opened to individual investors.

3.2.3.4 Actively involved foreign investors

Introducing foreign investors into the Shenzhen carbon market also boosts its liquidity. On August 8th 2014, CEEEX became the first domestic carbon market exchange to receive approval from the Foreign Exchange Bureau of Shenzhen to introduce foreign investors to participate in the carbon market via foreign currency or overseas RMB. With the introduction of more foreign institutional investors, the Shenzhen carbon market may gain further experience for the internationalisation of China’s carbon market.

3.2.3.5 Actively promoting carbon financial innovation

Carbon finance is the future of the carbon market. Shenzhen continues to actively promote the development of carbon finance and has achieved breakthrough results.

The first was to succeed in issuing the first domestic carbon bond. In May 2014, the China Guangdong Nuclear Power Holding Co., Ltd (CGNP) issued CGNP mid-term notes with carbon benefits (hereinafter referred to as carbon bonds) via the National Association of Financial Market Institutional Investors (NAFMII). CCEX, SPD Bank, National Development Bank, and the CGNP financial company were fully engaged in preparation for the carbon bond issuance. This was a milestone in the development of the domestic carbon market.

The second was the research of innovative carbon financial products. On April 22nd, 2014, CCEX signed an MOU with IFC on the cooperative development of innovative carbon financial products, and has already finished a draft design for the first products.

The third was to support the establishment of the first private carbon fund directly invested in the carbon market in China. On October 11th, 2014, the first carbon fund - GDR Carbon Fund was created in Shenzhen. This fund launched a standardised carbon asset development business and a secondary carbon market trading business. The emergence of the first carbon fund can further enrich the carbon finance sector in the future, and guide the flow of capital.

The fourth was the launch of the first carbon-related green-structured deposit business. On November 27th, 2014, CCEX, Industrial Bank of China Shenzhen Branch, and China Huaneng Group Asset Management Company jointly launched the first carbon-related green-structured deposit business. The innovation mainly consists in re-arranging the composition of interest on the basis of conventional savings products. Regulated companies apply for this service so as to receive both conventional cash interest and over 1,000 tons of allowances at the end of the deposit date. Evidently, green saving is a key structural innovation in the field of carbon finance, following on from green bonds.

3.3 Common problems faced by the Shenzhen ETS

3.3.1 Further improvement regarding stability and transparency of policies

Due to limited time and a heavy workload, the formulation of relevant rules lagged behind the issuance of the main regulations during pilot period. Shenzhen is at the forefront in terms of formulating and promulgating major regulation, such as the Provisions and the Regulation. However, the issuance of rules relevant to the Regulation has lagged, such as supporting measures on allowance auctioning, price reserve mechanism, allowance buy-back mechanism, and carbon offsetting mechanisms etc. Allowance auctioning affects the supply in the market, and is important for regulated companies and market participants to predict price trends. The carbon offsetting mechanism is regarded as a flexible compliance instrument to help regulated companies reduce their compliance costs. The special rules on types and origins of projects directly affect the profits of regulated companies. The uncertainty around rules presents challenges to decision-making for the carbon market participants (regulated companies, individual and institutional investors), especially for those who make long-term decisions to implement their emissions reduction plan.

Meanwhile, some regulated companies find it difficult to understand the principles and application of allowance allocation, as well as the variation in some aspects of verification methodologies and requirements, thus bring unnecessary anxiety to carbon asset management and carbon trading.

3.3.2 Enhanced performance of market functions

Compared to other mature capital markets such as the securities market, the Shenzhen carbon market still lacking full market functionality, mainly in the following four areas.

3.3.2.1 Serious shortage of liquidity in the carbon market

In terms of breadth, depth, flexibility and speed of transactions, the carbon market is seriously short of liquidity. In addition, at present the number of participants (regulated companies and investors) is relatively limited and the participants that are active are even fewer.

3.3.2.2 The carbon price signal is not accurate

The liquidity is not enough to create a real price signal and does not reflect the real cost of emissions reduction, thus cannot guide the investment decisions and emission reduction strategies of regulated companies. This means that emissions are not reduce in an optimal way.

3.3.2.3 Price risk not manageable for regulated companies

There is only spot trading in the Shenzhen carbon market. Therefore the regulated companies, lack financial instruments to hedge the carbon price risk and fix the emissions reduction cost.

3.3.2.4 The trading model is not efficient

The most efficient trading model - continuous trading - is not currently possible, on any of the carbon trading platforms. The current trading model - non-continuous trading - not only is not able to show the demand of the real-time market, but also distorts the pricing forming mechanism. Furthermore, because of the long delivery time (T+5) the participants have a low motivation to trade. Therefore, the market function of the carbon market is not completely brought into play. There is still a long way to go to enhance the performance of the market's functionality.

3.3.3 Greater effort on carbon information disclosure

The uncertainty and imperfect nature of the rules and regulations enhances the requirement for information disclosure. Disclosing information, both adequately and timely, is an important prerequisite for improving the confidence of market participants and to promote an orderly carbon market. Shenzhen has not yet established a sufficient information disclosure mechanism, especially in the following three respects:

3.3.3.1 Information disclosure lacks specific rules

Although currently Shenzhen has fixed channels and content on information disclosure, it has not set unified and comprehensive rules and guidelines to specify information disclosure.

3.3.3.2 The content of information disclosure is too short

Except for the Provisions, the Regulation, the trading rules, and daily transaction data, other information such as historical emissions data of regulated companies, the amount of pre-allocated allowances, the actual amount of allowances, and actual GHG emissions have not been disclosed yet. There is a large gap between the market demand and the actual amount of information disclosed.

3.3.3.3 Channels to disclose information are highly fragmented

The Shenzhen carbon market has many channels to disclose information, including public social media, government websites, CEEEX website, Microblogs, WeChat, email, etc. However, the information disclosed through most channels is limited, so information is highly fragmented and hard to collect.

3.3.4 Capacity building for senior managers and boards of directors urgently required

At the early stage of the carbon market, capacity building is necessary, especially for regulated companies. Though Shenzhen has invested a large amount of resources into capacity building for regulated companies after the launch of the carbon market, some regulated companies have revealed that they still lack of professional knowledge to comply with the requirements of regulation during the compliance process. This represents a significant barrier for companies to reduce emissions, implement MRV, fulfil their compliance obligations and participate in trading.

CHAPTER FOUR: SUGGESTIONS TO REFINE THE SHENZHEN ETS

During the first-year's operation, the Shenzhen ETS accomplished the desired goals, but was facing big challenges at the same time. In order to speed up the establishment of a national ETS, to enhance cooperation between the regional carbon markets and reinforce Shenzhen's carbon market, stakeholders in Shenzhen have expressed strong concerns on the refinement and improvement of the Shenzhen ETS.

4.1 Refine the internal mechanisms of the Shenzhen ETS

4.1.1 Strengthen policy development

Shenzhen attaches great importance to policy development. Shenzhen's carbon market is situated at the forefront of the policy nationwide. Shenzhen became the first ETS pilot that established a legal foundation for emissions trading via the Provisions passed by Shenzhen People's Congress in 2012, as well as the first ETS to be supported by legal Provisions Regulations. Thus, the project team strongly suggests that Shenzhen continues to strengthen the policy development on ETS to formulate a more comprehensive and sound ETS legal system which includes local rules, government regulations, normative and standardised documents, which will provide valuable experience to the establishment of a legal system for a national ETS.

Policy development plays an important role in the construction of an ETS. Internationally, emissions trading schemes are usually accomplished through the establishment of legislation and the issuance of normative documents, including detailed content from cap setting and allowance allocation with rigorous policy features, to registry management, MRV of regulated companies with strong technical specifications, to supervision and penalty rules in the form of law, and rules related to carbon trading such as transaction rules and member rules with strong commercial properties. These documents cover a wide range of areas including policy, law, technology, commercial and management, and are required to support and co-ordinate with each other. The establishment of a comprehensive and sound legal system for ETS is difficult and time-consuming, and requires significant resources and effort.

Therefore, Shenzhen should formulate and issue policies and regulations in accordance with the Regulation, including specified rules on allowance adjustment, allowance auction, price containment reserve, allowance buy-back, market stabilising funds and carbon offsetting mechanism. Shenzhen should also issue normative documents such as administrative rules on the registry and GHG information management to detail the management of the informational infrastructure. In addition, Shenzhen should issue regulations on the calculation and verification of industrial value added as normative documents to strengthen the foundations of MRV. Moreover, Shenzhen should explore the development of rules on carbon trading information disclosure, aiming to blaze a new trail on carbon market information disclosure.

4.1.2 Emphasise multi-party communication

Communication via clear channels, at a reasonable pace, among government departments as well as between government departments and regulated companies plays an important role in alleviating management pressure in an emissions trading scheme. It helps smooth the operation of the ETS, and motivate market participants to trade in the carbon market. Therefore, Shenzhen should establish communication mechanisms both among government departments, and between government department and market participants by using different approaches, at an appropriate pace and with different frequency. Such communication mechanisms could also be used in the national carbon market.

Government departments and market participants need to spend time and effort in establishing a smooth communication mechanism. They should establish fixed communication channels, clarifying the frequency of communication and carry out the communication earnestly. More specifically, the establishment of inter-departmental joint conferences should be held at least semi-annually and convened by the competent authority. The participants should come from the municipal authority, district-level authority and ground-level authority. Shenzhen should also establish an effective communication channel among Shenzhen carbon market stakeholders. For example, the competent authority could organise seminars and workshops for stakeholders, including industrial associations, regulated companies, and market investors. Shenzhen should also support industrial self-regulatory organisations, such as Shenzhen Emissions Trading Association, invite stakeholders throughout the supply chain of the carbon market to participate in the conferences, and push forward policy proposals on the development of the Shenzhen carbon trading supply chain. They should also have proactive communications with relevant government departments to reflect the aspirations of the entire carbon trading supply chain.

Moreover, launching workshops, seminars or symposiums with international organisations is another effective way to strengthen communications. Considering that regulated companies are lacking in capability for carbon assets management and carbon trading, Shenzhen should organise small-size, multi-layer and multi-frequency workshops, seminars and symposiums for regulated companies based on their actual performance in carbon asset management and carbon trading in 2013 and 2014. Shenzhen should avoid ‘one-size-fits-all’ training activities in order to make the workshops, seminars and training more effective for targeted companies.

4.1.3 Enhance market functioning

The role of the market function is crucial in whether emissions trading mechanisms can improve carbon resource allocation, reduce abatement costs, and accelerate emission reduction behaviour. At an early stage, when the market function plays a weak role, Shenzhen could make a useful contribution to the establishment of a national carbon market by finding out the reasons for weak market functioning, researching measures to enhance the market function and implementing these measures to test their effect.

The enhancement of the market function is guided by the principle of allowing the market to play a decisive role in resource allocation, which was mentioned in the Eighteenth Party Congress of the CPC. Shenzhen shall keep in mind the speech made by President Xi in January 2015, and learn from other mature or emerging capital markets to let the carbon market fully discover the price while maintaining and increasing the value of carbon assets. As a pioneer, Shenzhen is helping to find the path to set up a national carbon market and to break through the limitations of existing mechanisms. Shenzhen shall use effective price signals to guide the long-term emissions reduction measures of regulated companies. This will help keep the total social cost of abatement at the lowest level possible, while at the same time achieving the emission reduction targets. Shenzhen shall also aim to reduce the rising costs caused by emissions reduction, and its negative impacts on national economic growth and regulated companies’ growth. Furthermore Shenzhen shall create cleaner, greener and more sustainable jobs to promote the economic transformation and the low-carbon development.

Since carbon trading currently holds a special position in the fields international and national politics and economics, the competent authority in Shenzhen, in alliance with other relevant government departments, should communicate actively with national authorities and financial regulators in order to ensure the legal status of the emissions trading platform, to take separate supervision on the emissions trading platform as well as to distinguish it from other regional trading platforms. Similarly, Shenzhen should work with national authorities and regulators, to allowing the carbon market to break through the limitations of existing trading models, and explore a more

efficient price forming mechanism. The Shenzhen competent authority should advise the national competent authority and financial regulators to allow Shenzhen to develop even more innovative carbon financial products/trading, and to formulate strict supervision mechanisms, thus guaranteeing the stability, safety and effectiveness of the carbon market.

4.1.4 Explore information disclosure

Information disclosure refers to a system that aims to have market participants report their financial statement, their operating statement and other information to the competent authority and trading platforms. Subsequently the information will be released to the public in order to help the market investors fully understand the situation of their operation. Information disclosure is able to guarantee the interests of market investors since the public is able to supervise the companies in accordance with the legal requirements.

Information disclosure represents an instrument to help market investors master and understand the information affecting the targeted market participants and other stakeholders in a timely, complete and equitable way. It can avoid negative behaviour which would have adverse impacts on the market, such as fraud or manipulation from targeted market participants or other market investors via informational advantage. Meanwhile, information disclosure can provide important information sources for decision making. Therefore, information disclosure is extremely important for the establishment and operation of the market. In other words, the establishment and operation of the market not only needs a cash flow, but also an information flow. Without the guidance from this information flow, the cash flow will lose its direction and be diverted from the objectives and intention of the market. To a certain extent, the diversity and the transparency of information disclosed determines the level of maturity of the market. For the competent authority of the carbon market it is important to establish an information disclosure mechanism regarding the rules and developments in the carbon market. Furthermore it is necessary to build market confidence for the market participants, if the competent authority wishes to establish a mature, healthy, and sustainable carbon market. Thus, the competent authority should attach great importance to information disclosure and explore an information disclosure mechanism adapted to the needs of the development of the carbon market.

There is no mature precedent on information disclosure satisfying the needs of the current carbon market. Both domestic and international carbon markets are exploring ways to establish an effective information disclosure mechanism. From the market investors' perspective, the types of information available can affect investment decisions. Therefore they should be firstly determined, and separated into different groups in accordance with the types of information and their degrees of impact on the market. The origin of the information should be researched and judged, including but not limited to government departments, regulated companies, trading platforms, consulting agencies, third party verification bodies and market investors, etc. Once the source of information is clear, the internal mechanism for collecting the information from different sources and its impact on different source should be analysed, including the frequency, date or time to generate information, and whether the information relates to business secrets or has a significant impact on production and management. The feasibility to disclose this information and the approach of disclosure should also be clarified. If possible, further research on the information content, internal management process, the frequency and time to disclose, the depth and breadth of information, the format and rules on disclosure, as well as penalty rules should be established. If part of the information cannot be disclosed, further research on the alternative information including its type and sources are required, in other words, this information should be disclosed in an indirect way.

The final information disclosure mechanism should be issued from the competent authority via normative documents to regulate the behaviour of the carbon market in relation to information disclosure.

4.2 Accelerate the establishment of a national carbon market

4.2.1 Necessity to develop a regional carbon market

Explore approaches for the establishment of a national carbon market. Although the goal to establish national carbon market has been confirmed, the specific roadmap, approaches, and tasks are not clarified yet. The pilot areas have more experience in the construction, operation and management of ETS than the areas which have not yet established a carbon trading pilot. Therefore, in order to smoothly transition to a national market, Shenzhen should launch regional cooperation with non-pilot areas via developing a regional carbon market in order to accelerate the carbon trading capacity of governments and companies in non-pilot areas. This could be a good contribution to the establishment of a national carbon market.

Improve the liquidity of the carbon market. In its first compliance year, the Shenzhen ETS accounted for 2.5% of all allowances among the seven pilots, but accomplished 12.6% of the transaction volumes and 22.85% of the turnover. However, Shenzhen has the inherent disadvantage of a small volume of allowances. It severely limits its carbon market liquidity and carbon financial innovation. Through regional cooperation, Shenzhen could expand the scale of the market, thus laying the foundation for the improvement of liquidity.

Enhance the capability of price discovery. Different sectors and companies have different emissions reduction capacities and costs. The effective balance of these differences could help to discover a more accurate price, in other words, could serve as a foundation for emission reduction strategies in different sectors and companies. Enhancing regional cooperation could expand the scope and coverage of Shenzhen's carbon market, and make price discovery work in a more effective way.

Reduce abatement costs of regulated companies. Like the differences in the overall abatement costs for different sectors, the overall abatement costs for different geographic areas are different. Compared with central and western areas of China, Shenzhen's regulated companies face greater pressure in emission reduction. That is because the scope for energy saving and emission reduction is smaller but the costs are higher.

Regional cooperation and expansion of the scope and coverage of the Shenzhen carbon market could assist in incorporating regulated companies with more room for energy saving and emission reduction but lower emission reduction costs, thus providing more opportunities for Shenzhen's regulated companies to reduce emissions at low cost.

4.2.2 Suggestions on the development of a regional carbon market

The development of a regional carbon market faces many challenges, especially with respect to cap setting, allowance allocation approaches, the scope and coverage of regulated companies, as well as harmonization of MRV rules and guidelines, supervisory mechanism and relevant legal liability etc. Full consultations among governments are required. In concert with the policies on national carbon market development, Shenzhen should collaborate actively with other areas so as to explore a path towards establish a nationwide carbon market. In the process of regional cooperation, Shenzhen shall continuously pay attention to the national assessment and direction towards establishing the national carbon market, and constantly adjust its measures of regional cooperation, in order to keep regional cooperation coherent and consistent with the development of the national carbon market.

4.3 Implications from the Shenzhen ETS Pilot Experience for the National Carbon Market

On December 10th, 2014, the National Development and Reform Commission (NDRC) issued the Provisional

Regulation on Carbon Emission Trading System, which clarified the two-level management system between the NDRC and provincial DRCs. It also explained the framework and principles for setting the total amount of allowances, covered sectors and companies, allowance allocation approaches, registry and carbon emission trading platforms, as well as for developing MRV, market supervision, penalty rules and legal liabilities, which provides important support for the construction of a national carbon market. With the development of the national carbon market accelerating, questions about how to sum up their experience and to provide suggestions for the national market have become an important concern for each pilot area during the process of self-evaluation and refinement of their ETS. Following are suggestions for the development of the national carbon market, in accordance with Shenzhen's experience of ETS.

4.3.1 Developing the foundation of the National ETS

4.3.1.1 Legislation

A strong legal basis is one of the important guarantees for the smooth functioning of the Shenzhen ETS and successful compliance. For the development of the national ETS, the enforcement of law as a binding force is vital. Therefore, Shenzhen suggests the acceleration of legislation to underpin a national ETS. This will set a strong base for the establishment of a national carbon market and will help smooth its implementation.

4.3.1.2 Comprehensive supporting rules

For the top-level design of an emissions trading scheme, in addition to strict legal enforcement, there should be comprehensive supporting rules, regarding specifications and guidance to guarantee that the eight essential elements of ETS i.e. scope and coverage, cap setting, allowance allocation, MRV, registry, trading system, compliance mechanism, and market adjustment, are defined in a clear and transparent way. The supporting rules, specifications and guidance should ensure that supporting elements and the top-level design both complement and reinforce each other.

The Shenzhen ETS design fully takes into account the industry structure, and adopts a dual control on total emissions and carbon intensity. Its design satisfied on the one hand the requirements of the cap, and on the other hand ensured regulated companies' need for economic growth. Therefore, setting a scientific cap and coverage, which balances the economic growth among the provinces, by combining national carbon intensity goals with medium-term and long-term goals, will be key to a successful national ETS. Secondly, establishing a nationwide unified MRV mechanism, supporting rules, as well as certification, accreditation and regulatory requirements for third party verification bodies provide the cornerstone of real, accurate and reliable data.

4.3.1.3 Deregulate trading methods

The ETS pilot has been hard hit by the No. 37 and No. 38 central government documents, which place curbs on trading methods and delivery, thus affecting the pricing mechanism, liquidity and activity. The project team suggests active negotiation among different departments on policy and management to deregulate the trading method and delivery restrictions to ensure the healthy and effective operation of the national carbon market.

4.3.1.4 Set up a resilient information disclosure mechanism

Healthy and mature markets, no matter if it is a commodity market, financial market or carbon market, require that the market participants can obtain all relevant information in a timely, comprehensive and fair way. Currently, neither the ETS pilots nor the national carbon market have established a systematic information disclosure

mechanism. Regardless, efforts are being made to explore and refine current information disclosure mechanisms. Therefore, during the preparation for a national carbon market, the national competent authority should analyse the types, origins, degree of impacts and market requirements for information based on current ETS pilot experience. It should establish the content, format, requirements, process, channels and penalties for unlawful acts in relation to information disclosure in the future in order to achieve a comprehensive nationwide carbon information disclosure mechanism.

4.3.2 National Carbon Market Cultivation and Capacity Building

4.3.2.1 Capacity building for companies

During the operation of the Shenzhen ETS, the companies' awareness, knowledge and capacity have long-term and significant impacts on the operation and development of the carbon market, which is one of the significant factors regarding the degree of participation, activity and compliance results. Therefore, during the development of a national ETS, it should place great importance on market cultivation and capacity building, and carry out long-term promotion, education and training for the key regulated companies in terms of climate change, ETS market mechanisms, energy saving technologies as well as carbon asset management and carbon trading in order to give the national carbon market a broad base of social recognition and corporate support, thus guaranteeing the effective implementation of the national ETS.

4.3.2.2 Cultivate market service institutions

Within the system of a national carbon market, in addition to the regulated companies, carbon market service institutions, such as carbon asset management and consultancy firms, energy saving service companies, carbon market service companies and financial institutions assume major responsibilities for market cultivation in order to promote the maturity of the emerging carbon market. Therefore, during the development of a national ETS, the relevant departments should attach great importance to the cultivation and policy support for service companies in order to establish a mature industrial chain throughout the ETS via strengthening the power of service companies. The mature supply chain of the ETS could then better service market participants, and jointly foster a national carbon market.

4.3.2.3 Step up market openness

The limitation of the pilot carbon markets and the deficiency of trading activity and liquidity are highly related to the openness of the current pilot carbon market. The project team advises the national competent authority and financial supervision department to set up a regular communication and negotiation mechanism among different governmental departments, and strive for an open policy for the carbon market, to break through the limitations in terms of transaction methods, increase the types of trading products, and expand the scope of market participants.

4.3.3 Supervision of the national carbon market

4.3.3.1 Establish a supervision function and supervision mechanism

A mature and efficient carbon market is inseparable from a sound and systematic supervision mechanism. The national carbon market will cover a large volume of emissions overall, and is expected to follow a graded management system. Since provincial competent authorities display huge differences in terms of administrative ability, self-regulation and the degree of compliance with rules, the national competent authority must carefully design the supervision mechanism from top to bottom, build an infrastructure of functional departments, determine

the workflow between the superior and the subordinates and the communication mechanism, as well as introduce unified legal rules on market supervision in order to reduce the low accuracy of emission data, the differences in terms of data quality and verifiable levels and the risks from unlawful acts due to irregular transaction behaviour.

4.3.3.2 Establish effective communication mechanisms

During the preparation phase, Shenzhen set up communication mechanisms via different channels, and fully understood the companies' opinions, feedback and requirements in relation to rules and regulations, thus effectively guaranteeing information sharing between the government and regulated companies. During the development of the national carbon market, the project team advises to set up regular communication mechanisms, smooth communication channels, deterministic communication efficiency and involve industry associations in order to refine the regulations of national carbon trading and political balance in terms of the cap setting and allowance allocation, improve the registry, MRV, trading behaviour as well as clarify the supervision and legal liability. Fully balancing the interests among competent authorities, market participants and stakeholders along the value chain can effectively promote the operation of the national ETS.

4.4 Research on the national market

With the accelerated pace of the establishment of a national carbon market, pilots have gradually come to attach great importance to the relationship between themselves and the national carbon market, and in particular the ways and methods to move toward a national carbon market. On December 10th, 2014, the National Development and Reform Commission (NDRC) issued the Provisional Regulation on Carbon Emission Trading System, which provides important support for the development of the national carbon market. In this context, exploring the transition from the pilot carbon market to the national carbon market is very important.

Three issues characterise the process of transition, in which are as follows. The first is the path and approach to establish a national carbon market, namely whether ETS pilots would be pulled down or be linked together to establish the national carbon market. The second is whether the ETS pilots would continue or stop, namely whether ETS pilots would still exist after the establishment of a national carbon market. This question is closely related with the first question. The third is how the ETS pilots would react to the establishment of the national carbon market under different paths and approaches. For example, if the national carbon market is built upon ETS pilots and its expansion via regional carbon markets, pilots should proactively conduct regional cooperation and take full advantage of their experience to build a more active, healthy and sustainable regional carbon market as required by NDRC. If the sectors covered by the national carbon market partly coincide with sectors covered by the pilots, it is important for the pilots to coordinate with the national carbon market. Pilots could continue their carbon trading for sectors not covered by the national carbon market, or stop completely. If the pilots continue to run, there should be a careful consideration on whether the pilots would connect with the national ETS, how to connect, and the effects and impacts from this connection. If the pilots stop, the competent authority should consider a "withdrawal mechanism" in advance, including the measures to deal with excessive allowances, MRV and supervision, transformation of the trading platform in order to protect the interests of the market participants and to accomplish a smooth stop.

Therefore, Shenzhen's competent authority should conduct in-depth research on the linkage between Shenzhen's carbon market and the national carbon market, and bring forward strategies and measures to stabilise the market, guarantee the legitimate rights and interests of market participants in Shenzhen's carbon market, and enhance the market participants' confidence in the national carbon market.

Appendix: Case studies on Shenzhen's Regulated Companies

In-depth research about the performance of regulated companies is an important way to observe the operation of an emissions trading scheme. During the operation of this project, the project team investigated the carbon asset management and trading situation of 30 regulated companies through online surveys. Faced with newly introduced emissions trading mechanisms, regulated companies adopt different and flexible measures. In order to promote good practice from regulated companies, to avoid repeating historical mistakes and lessons, as well as to provide the best practices for other participants, the project team provides typical case studies for the Shenzhen ETS to help better accomplish the emission reduction target and carbon asset management.

CASE STUDY ONE

Company A: Uses KPI to examine emissions reduction, boosts re-investment through carbon trading.

Company A has its main business in grain and oil production and about 700 employees. The company's total asset in 2013 were CNY3.07 billion, its industrial value added was CNY0.9 billion; it achieved a profit of CNY0.24 billion, and paid taxation of CNY0.34 billion.

Company A had a high awareness on energy saving and emission reduction, and invested huge amounts in technical innovation of energy saving. By linking KPI assessment, the company encouraged employees to create innovative measures for energy saving and emission reduction, and take full advantage of early energy saving and emission reductions effects to further invest into energy saving under the influence of the carbon trading mechanism.

High investment in energy saving technical innovation

Company A regards energy saving not only as a requirement from government and society, but also as an inevitable choice to improve its competitive ability. Therefore, between 2011 and 2013, company A invested CNY0.1 billion to boost productivity, CNY50 million was directly spent on energy-saving technological innovations. There were 12 main energy saving projects which saved a total amount of 6,700 tons of standard coal annually, and saved a large amount of fees on electrical charges and gas. Some projects significantly reduced production costs. Thus, the company can reclaim the cost of investment in 3 years.

Attaches great importance to energy saving innovation within teams

Company A is dedicated to training their staff in their capability and activities in energy saving and emission reduction projects. On one hand, it raises the employees' sense of being creative and continuing to improve work efficiency via a series of energy saving and emission reduction activities. On the other hand, company A incorporates energy saving and emission reduction targets into the annual KPI assessment, and applies the examination of KPI's index to the technical processes, types of energy and control points. Company A examines and reports the KPIs each month, and links the results with the performance evaluation assessment at the end of the year.

Carbon trading profits boost further investment into energy saving and emission reduction

Company A achieved benefits from energy saving and emission reduction quickly during the 2013 compliance period. Thanks to early preparation for energy saving and emission reduction results, company A has 40,000 tons of allowances remaining. By selling 40,000 tons of allowances, company A has made around CNY2.8 million in gains. After receiving benefits from the energy saving and emission reduction technical transformation, in 2014 the

company re-invested 18 million CNY to expand a wider range of technical transformation. In accordance with its calculation, company A can reduce costs significantly (up to CNY18 million in one year). If profits from carbon trading were added, the cost recovery period would be decreased by 2 months.

CASE STUDY TWO

Company B: Established a carbon asset management team; implemented control of procedures in carbon trading

Company B, with its main business in the production of plastic components of larger copiers and printers, has registered capital of CNY0.15 billion, and annual sales revenues over CNY0.2 billion.

Company B set up a carbon asset management team, an energy saving and emission reduction improvement team and a carbon trading management team by convening the heads of related departments to attend. The aims were to effectively assist the company in energy saving and emission reduction and to accomplish the targeted goal and upgrade and adjust the industrial structure. The process of participating in carbon trading was adapted to the management process and was given great importance by senior leaders. They accomplished full communication between superiors and subordinates, in order to help the company grasp the appropriate trading time. Moreover company B pursued a 'buy low and sell high' trading strategy to utilise its surplus in carbon allowances as an asset to invest in the carbon market, thus achieving a profit of about CNY0.1 million.

The energy saving and emission reduction team ensures the company accomplishes its emission reduction target with surplus in allowances.

Company B set up an energy saving and emission reduction improvement team. In the team, the General Manager served as the team leader, and the Head of Equipment Department and Financial Department served as vice-team leader. The Heads of six other manufacturing departments and the General Affairs Department served as team members. The company also established a suggestions box on energy saving and emissions reduction to collect the employees' opinions, which were used to make regular improvements accordingly. Since 2005, the company has taken several measures, such as adopting energy saving facilities, industrial upgrading and equipment automation to reduce emissions and to achieve industrial upgrading. Pushed by these activities, in 2013, its carbon intensity declined by 0.2 tons per CNY10,000 of GDP, and the carbon intensity is expected to reach 1.3 tons per CNY10,000 of GDP in 2014 (a decline of 0.3 tons per CNY10,000 of GDP). The expected reduction in carbon intensity was 0.39 lower than the 2014 target goal, thus achieving a surplus in allowances.

Master the emission reduction data accurately through the dedication of a carbon trading management team

Company B has appointed responsible persons for carbon trading management. The team consists of 5 people: 1 from the General Affairs Department, 1 from the Financial Department, 1 General Manager Assistant as well as 1 Principal Account Representative and 1 General Account Representative for the registry. The team could acquire accurate financial and operational data, and use these data to estimate monthly GHG emissions and industrial value added, thus mastering the difference between the annual actual allowances and actual emissions in advance, and ensuring sufficient allowances remain.

Implementing control of process to attain the proper trading time

Company B set up processes in carbon trading management. First, the General Account Representative and Principal Account Representative apply to the company for the intention and amount to buy or sell. Then, the

competent authority examines and approves the intention, and sends it to the CEO for final approval. Finally, the company should send an email to the headquarters in Japan for notification of the deal. This management process makes all departments understand their division of work and responsibilities. Once the trading strategy has been agreed, the progress of approval and implementation is fast. Therefore, the company can grasp the appropriate trading time, and achieve the 'buy low and sell high' trading strategy, thus receiving a profit of dozens of RMB.

CASE STUDY THREE

Company C, with its main business in plastic products, plastic moulds, and household appliances etc., has around 1000 employees. Its total assets in 2013 were CNY50 million, achieving sales revenues of CNY0.16 billion and paying taxation of CNY1.75 million.

Company C continues to enhance its energy infrastructure and technical transformation, as well as carefully calculate investment, energy saving, emission reduction results and profits from energy conservation activities. The company also takes full advantage of the carbon trading to improve overall revenues from energy saving and emission reduction to enhance the competitiveness of enterprises.

Enhanced the management of energy infrastructure

The company set up an Energy Management Committee at enterprise level, which consists of technical managers from the Electrical and Mechanical Department, Administration Department, Financial Department and Production Department etc. The Committee is in full charge of implementing energy saving projects, energy statistics, energy management, monitoring emissions from main energy-consuming appliances and improving their efficiency, calculating the amount of energy consumption etc.

Carefully calculated the costs and outputs from energy saving

From July 2014 to December 2014, company C accumulated investment of CNY7.66 million in energy saving, and achieved 40%+ energy saving from its main energy-consuming appliances.

During the implementation process of the energy saving and emission reduction, company C carefully calculated the project investments, energy saving rate, annual savings in amount of electricity and electricity charge, as well as the savings in amount of energy (tons of standard coal) and the amount of carbon emissions (tons of CO₂ equivalent). The company, therefore, could clearly understand the costs and profits from each energy saving they made, and guide further investment decisions in energy saving and emissions reduction.

Year of Construction	Content of Construction	Size of Construction	Amount of Investment (10,000 CNY)	Energy Saving Rate	Month Electricity Saving (kWh)	Annual Electricity Saving (kWh)	Annual Electricity Bills Saving (10,000 CNY)	Annual Standard Coal Saving (tce)	Annual CO2 emission reductions (t)
Sep 2012 – Nov 2012	Energy-saving transformation on Servo Injection Moulding Machine	52 Injection machines	265	51%	134119	1609428	144.8	527.9	1503.8
July 2012 – Oct 2013	Elimination and Upgrading of Servo Injection Moulding Machine	10 Haitian injection machine	203	42%	18918	227016	20.4	74.5	212.1
Feb 2013 – Aug 2013	Frequency conversion system for automatic painting line	1 coating line on baking and spray	110	10%	2160	25920	2.3	8.5	23.9
Jan 2014 – March 2014	Renovation in Energy-Saving Workshop LED Lighting Systems	LED lights in 3 workshops	16	63%	37035	444420	40.0	145.8	409.9
May 2014 – June 2014	Energy-saving renovation on Infrared heat compression machine	54 injection machines	52	43%	14136	169632	15.3	55.6	156.5
Aug 2014	Upgrading granulator with Frequency conversion system	1 granulating machine (90KWH)	40	18%	2486	29832	2.7	9.8	27.5
Dec 2014	Elimination and Upgrading of Servo Injection Moulding Machine	2 injection machine (280 tons)	80	46%	6962	83544	7.5	27.4	77.1
			766	40% +				849.5	2410.8

Table 1: Investments and Revenues of Energy Saving Projects

Took full advantage of the carbon market to realise gains from energy saving and emission reduction

The launch of the carbon market provided good opportunities for companies to accelerate gains from energy saving and emission reduction. In its 2013 compliance period, the company sold surplus allowances of 8,700 tons (contributes to 27% of energy saving and emission reduction) and received gains of CNY0.66 million. Sticking to its 2012 and 2013 total investment in energy saving and emission reduction as a baseline, the company could retrieve its investment in energy-saving measures in 3.5 years. Instead, with the profit from emission trading, the company retrieved its investment in 2.9 years, which is 7 months earlier than expected. The company believes that with the approach of 2014 compliance date, carbon trading could help the company retrieve its costs in energy saving and emission reduction in a more convenient way.

CASE STUDY FOUR

Company D: Purchased allowances in multiple time periods to remedy shortages and to meet its compliance obligation at low abatement cost

Company D has its main business in the production of plastic components for copiers, printers and projects. It has 1000 employees in total with a sales revenues over CNY0.2 billion per year.

This company has a shortage in allowances. Therefore it develops an energy management system to pre-calculate carbon emissions and accurately define the gaps between actual emissions and allowances. It also attaches great importance to the trend of the carbon price, and to purchase a certain amount of allowances in several time periods in order to reduce abatement cost and meet its compliance obligation.

Exploiting carbon emissions benefits from an Enterprise Energy Management System

First, they established a team specifically for energy saving and emission reduction. The company set up an enterprise energy management team, which develops and implements energy saving plans. The team is led by the chief of the factory, the chief of the environmental commission acts as deputy leader, and the chiefs of the Production Department and Administration Department act as committee members. Second, they established an energy management system. The company should continue to improve its energy management system as outlined in its energy management system documents. Through organising regular conferences on environment and energy management, the company will self-check the targets and indicators set by the existing environment and energy management plan, as well as follow up on implementation. Third, they implemented monthly collection of statistics. The department for semiconductor manufacturing is responsible for energy statistics, energy analysis and energy management, in alliance with the quality department, management department and purchasing department. The department of semiconductor manufacturing collects monthly energy consumption data of the entire factory and each workshop. Once the statistical reports have been verified by the department managers, the department of facilities will collect the reports and formulate the monthly report on energy consumption. These reports provide the foundation of cost calculation for each department and the amount of energy consumption from outside. Each department will analyse the relevant data to identify problems. Fourth, they established a reporting system. As the request of the Guangdong Energy Conservation Supervision Centre, the company should register on the Guangdong Energy Information Online Management Platform for energy-intensive companies, and download the reporting software. Once finished reporting, the company could submit the status of its energy consumption.

To take these measures, the company should have a complete record of data, and an effective management method that helps the company estimate its carbon emission situation effectively, and to gain a clear understanding of the shortage or surplus in allowances in order to develop effective coping strategies.

Trading strategy in multiple time periods to reduce abatement cost

After gaining a clear understanding of the emissions and surplus or deficit in allowances, company D develops an allowance buying strategy based on the fluctuation in price. In May 2014, the market price of allowance declined slightly from 77 CNY/ton, and company D began to pay constant attention to the market price trend. When the price fell back to 75 CNY/ton, company D set the purchasing volume for different periods: it bought a small amount within the price range of 72-75 CNY/ton; it bought a medium amount within the price range of 68-72 CNY/ton; it bought a large amount within the price range of 68 CNY/ton and under. Finally, it bought an amount of allowances for compliance purpose at a cost lower than the average trading price of May and June.

Higher awareness on carbon trading, and proactively face compliance risk

Company D pays close attention to policy dynamics and information from the carbon market. It proactively participated in the first allowance auction organised by the government and purchased allowances at lower cost, thus further reducing its compliance cost and compliance risk.

CASE STUDY FIVE

Company E: Confronted with significant losses due to negative response; exposed to high risks due to concentrated trading

Company E specialises in the production of blow-moulded articles and offers fluoride treatments on the surface coating of plastic. It has 1000 employees, and generated CNY0.232 billion sales income in 2013 with annual taxation of CNY5 million.

Company E responded negatively to the first compliance period, and therefore the verification time lagged and the GHG emissions report failed to reflect the real situation. Meanwhile, since the company does not have a plan for purchasing allowances, the cost of compliance became artificially high.

Missed business opportunities due to a negative response on verification

Company E neglects the risk from policy change, and responds to the task on carbon market verification reporting negatively. Therefore, the verification task was completed 3 months later than the required time, thus missing the time to appeal and adjust the allowances. The amount of allowances required to submit was 10,000 tons over the actual emissions, leading to a significant loss from allowance allocation. Later it responds to the policy, and on the one hand faced a tight trading period prior to compliance, missing the chance to buy allowances cheaply; on the other hand, due to time pressure, the company could not transfer the costs to its products via cost pass-through, and finally missed the business opportunity.

Concentrated trade before the compliance period; high cost to fulfil compliance obligation

Company E has attached low importance to carbon trading. It continued trading allowances in spite of a shortage in allowances at an early stage. The company therefore had to purchase allowances before the compliance period. During that period, the market price increased significantly due to increased demand in a short period and uncertainty over the amount of allowances; therefore, the company had higher costs for carbon trading. Compared with the average price of allowances (50-60 CNY/ton) at the earlier stage, the allowance price rose to 75-80 CNY/ton with the approaching compliance period. Therefore, the company had to pay extra compliance costs.

The concentrated trading led to the difficulty to discover abatement cost, as well as the difficulty to assess risk, therefore, the company had to bear the risk of a rising price (over CNY0.3 million).

'Remedy measures' include exploiting the space for emissions reduction immediately after the compliance period.

The company has gradually come to attach importance to emission reduction responsibilities after the experience of reducing emissions via the market mechanism. It further exploits the space for emissions reduction. In 2014, it plans to invest CNY2.5 million in emissions reduction, and expects to save 1.843 million Kwh of electricity per year. The cost could be retrieved in 1.8 years. Meanwhile, the company plans to invest CNY4 million in the next two years to develop new energy saving techniques. Once exploiting the space for emissions reduction, the company expects to reduce the annual amount of excess emissions for 2013, and predicts it will reduce its amount of allowances used by 65%. Compared to the amount of allowances received by the company, the emission reduction could evidently be beneficial for the company in order to reduce abatement costs and trading cost, as well as reduce effectively the pressure on passive trading and provide more space for trading.



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