

# China Carbon Market Monitor



February 2016/No.3

The **PMR China Carbon Market Monitor** provides timely information across the seven Chinese pilot carbon markets. It also provides analysis of climate policy and market developments at the national level.

## Highlights

- As of December 31, 2015, the secondary carbon market for the seven ETS pilots has accumulated a total trading volume of 49.8 million tons, representing a trading value of US\$ 232.3 million, and an average price of US\$4.66/ton.
- In the final quarter of 2015, Hubei remained the most active pilot market (43.77% of the total trading volume), followed by Shenzhen (29.25%).
- The average price during this reporting period in the Shenzhen, Beijing, and Tianjin carbon markets has been slightly higher than that in last reporting period (from April to August, 2015), while the average price in Shanghai, Guangdong, Hubei, and Chongqing has been lower.
- As of December 31, 2015, 341 China Certified Emissions Reduction (CCER) projects have been registered by China's National Development and Reform Commission (NDRC), among which 83 projects have issued a total of 25.04 million tons of emissions reduction credits. Seventy-six percent of these are pre-CDM projects. Moreover, a cumulative total of 32.47 million tons of CCERs have been traded on the pilot trading platforms (i.e., "exchanges"), three-fourths of which on the Shanghai exchange.
- In order to complete the preparatory work for the launch of China's national carbon emissions trading market in 2017, NDRC issued a landmark notice to Development and Reform Commissions (DRCs) on January 19, 2016 that clarifies the priority work and timeline that each must complete in 2016. More importantly, it provides technical guidance, including a "help desk," that DRCs can use for submitting historical emissions data and lists of covered entities.

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### Disclaimer

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# Pilot Carbon Markets

At the close of 2015, 49.8 million tons of emissions allowances have been traded on the secondary market across the seven carbon markets since trading began in 2013. This accounts for a total value of US\$232.3 million and an average price of US\$4.66/ton. Online trading and over-the-counter (OTC) transactions made up 72% and 28% of the total volume, respectively, and 76% and 25% of the total trading value, respectively.

Trading across these markets is the most active just prior to the close of the compliance period. Unsurprisingly, the start of a new compliance period is characterized by slower trading, as markets adjust. The 2015 compliance period ended in July, and trading in August was slow to materialize. Market liquidity recovered by September (with the exception of Shanghai), but did not last, falling considerably through the end of December. Several conditions mean it is still challenging for many enterprises to accurately estimate annual emissions, reducing motivation to trade actively. The Chinese economy slowed in 2015, meaning emissions from last year may be a poor predictor for 2016. Furthermore, some enterprises still struggle with emissions data collection and with embracing a strategy for ensuring compliance. Weak market activity through the close of 2015 reflects delicate enterprise confidence with the carbon market.

Trading volumes were highest on the Hubei market, where nearly 23 million tons were traded between September and end-December 2015, the vast majority OTC. This is nearly double the volumes traded in the [first report of this Monitor](#) published in May 2015. The Tianjin and Chongqing markets both traded fewer than 2 million tons each, a performance that remains consistent since the start of trading in 2013.

Trading prices have been consolidating since September 2014 but continue a downward sloping trend since overall trading began in June 2013. Between September and December 2015, Beijing and Shenzhen reported the highest average prices at US\$6.44/ton and US\$6.07/ton, respectively, but also the most price volatility. At US\$1.07/ton, the Chongqing market had the lowest average price during the same period.

Below is a summary of the activity in each of the seven pilots between September 1 and December 31, 2015. Except for the Guangdong market, the data reported are for the secondary market, including online trading and over-the-counter (OTC) transactions. For market performance in 2016, the China Carbon Market Monitor will begin to report on a quarterly basis.

## Shenzhen

Shenzhen Pilot: September 1 –December 31, 2015	
Total Volume	2,353,100 tons of SZA13, SZA14, SZA15
% of total volume of all 7 pilots	29.25%
Total Value	US\$ 14,285,592
% of total value of all 7 pilots	44.48%
Average price	US\$6.07/ton

Figure 1. Cumulative Traded Volumes in the 7 Pilots (Million tons, September 1 - December 31, 2015)

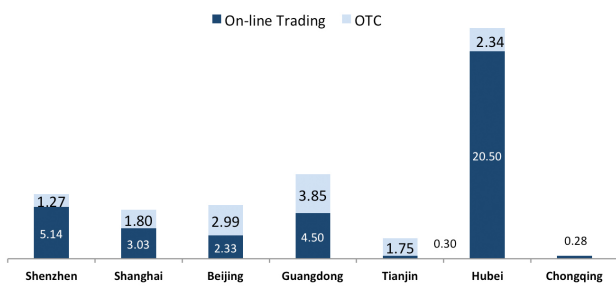


Figure 2. Cumulative Trading Value in the 7 Pilots (Million US\$, September 1-December 31, 2015)



Figure 3. Daily Average Price of Online Trading (US\$/ton) (June 18, 2013 - December 31, 2015)

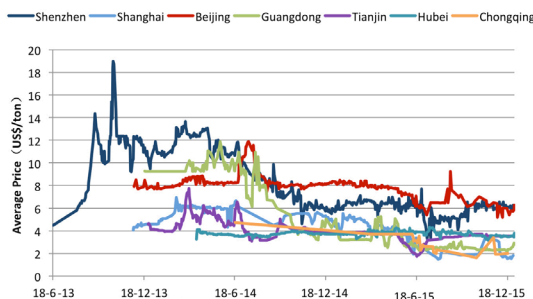
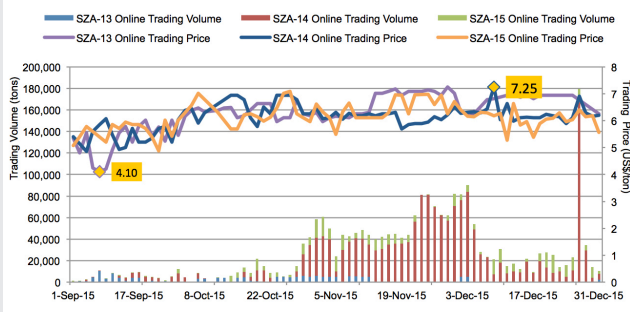


Figure 4. Shenzhen Carbon Markets: Online Trading (September 1-December 31, 2015)



<sup>1</sup> In China's pilot markets, all transactions—including OTC—must take place on trading platforms (i.e., exchanges).

## Highlights

- Shenzhen performed well on volume (2,353,100 tons) and value (US\$14,285,592), ranking second and first among the seven pilots, respectively. Sale of Shenzhen Emissions Allowances for 2014 (SZA14) accounted for 75.4% of the total volume, making it the most traded product among all markets.
- 2,259,847 tons of SZA13, SZA14, and SZA15 were traded online, with a total value of US\$13,808,976. Their online trading prices ranged from US\$4.10/ton to US\$7.25/ton, which was the highest recorded price among all markets during this period.
- OTC trading, which is far below that of online trading, totaled 93,253 tons at a value of US\$476,616.
- Shenzhen is the only pilot market to have allocated all 3 years of emissions allowances at once and to allow participants to reserve surplus allowances for future compliance and trading. This has helped the Shenzhen market retain liquidity.

**Table 1. Shenzhen Secondary Carbon Market Data**  
(September 1 – December 31, 2015)

Time	Contract	Online Trading		OTC	
		Trading Volume (tons)	Trading Value (US\$)	Trading Volume (tons)	Trading Value (US\$)
September	SZA13	45,786	226,041	0	0
October		52,346	328,300	0	0
November		41,626	257,751	0	0
December		12,221	76,731	0	0
Sub-total		151,979	888,823	0	0
September	SZA14	52,019	289,937	0	0
October		88,190	554,368	0	0
November		886,825	5,401,518	30,000	157,728
December		677,442	4,176,001	52,583	267,850
Sub-total		1,704,476	10,421,824	82,583	425,578
September	SZA15	6,850	39,254	0	0
October		66,124	403,683	10,670	51,038
November		162,986	1,026,394	0	0
December		167,432	1,028,998	0	0
Sub-total		403,392	2,498,329	10,670	51,038
<b>Total</b>		<b>2,259,847</b>	<b>13,808,976</b>	<b>93,253</b>	<b>476,616</b>

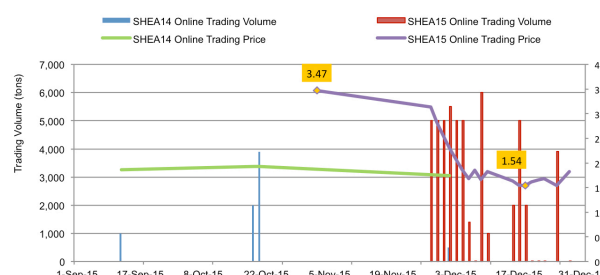
## Shanghai

Shanghai Pilot: September 1 – December 31, 2015	
Total Volume	669,232 tons
% of total volume of all 7 pilots	8.51%
Total Value	US\$1,371,585
% of total value of all 7 pilots	4.35%
Average price	US\$2.05/ton

## Highlights

- Trading of Shanghai Emissions Allowances (SHEA) both on-line and OTC reached a total of 669,232 tons in volume (8.51% of the total) and US\$1,371,585 in value (4.35% of the total). After the compliance period, SHEA15 became the dominant trading product as the key compliance instrument for the 2016 compliance period.
- 59,232 tons of SHEA were traded online at a value of US\$123,298. The price of SHEA14 was stable, fluctuating about US\$1.80/ton, while the price of SHEA15 fluctuated more significantly from US\$1.54/ton to US\$3.47/ton. The average online trading price of SHEA was US\$2.08/ton, the second lowest price of all seven pilots to date.
- OTC trading volume was higher: 610,000 tons traded at a value of US\$1,248,287. The average OTC trading price was US\$2.05/ton, slightly lower than the price for online trading.
- As trading on the Shanghai market is driven by compliance, the market was correspondingly inactive following the end of the compliance period in July 2015.

**Figure 5. Shanghai Carbon Market: Online Trading**  
(September 1-December 31, 2015)



**Table 2. Shanghai Secondary Carbon Market Data**  
(September 1 – December 31, 2015)

Time	Contract	Online Trading		OTC	
		Trading Volume (tons)	Trading Value (US\$)	Trading Volume (tons)	Trading Value (US\$)
September	SHEA14	1,000	1,867	0	0
October		5,897	11,374	0	0
November		0	0	0	0
December		501	874	0	0

## Beijing

Beijing Pilot: September 1 –December 31, 2015	
Total Volume	34,346tons
% of total volume of all 7 pilots	0.44%
Total Value	US\$221,041
% of total value of all 7 pilots	0.70%
Average price	US\$6.44/ton

### Highlights

- 100% of the trading of Beijing allowances (BEA) took place online, totaling 34,346 tons traded at a value of US\$221,041. About half took place in September.
- The daily average price declined from a peak of US\$7.17/ton in mid-September to US\$5.18/ton by mid-November, before rising again to US\$6.25/ton by end-December. The average price for BEA remained the highest among all markets, more than 3 times that of Chongqing's (the lowest).
- Trading dropped off considerably starting in October. Individual investors, attracted by the high trading price, purchased allowances but not in significant enough volume to stimulate the entire market.

Figure 6. Beijing Carbon Market: Online Trading (September 1-December 31, 2015)

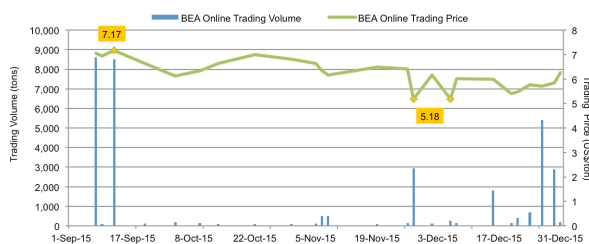


Table 3. Beijing: Secondary Carbon Market Data (September 1-December 31, 2015)

Time	Contract	Online Trading		OTC	
		Trading Volume (tons)	Trading Value (US\$)	Trading Volume (tons)	Trading Value (US\$)
September	BEA	17,520	124,420	0	0
October		450	2,998	0	0
November		4,320	23,948	0	0
December		12,056	69,675	0	0
<b>Total</b>		<b>34,346</b>	<b>221,041</b>	<b>0</b>	<b>0</b>

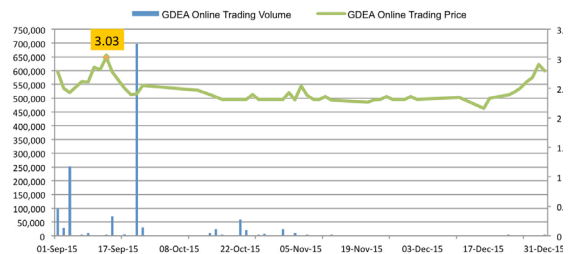
## Guangdong

Guangdong Pilot: September 1 –December 31, 2015	
Total Volume	1,395,806tons
% of total volume of all 7 pilots	17.75%
Total Value	US\$3,427,962
% of total value of all 7 pilots	10.88%
Average price	US\$2.46/ton

## Highlights

- Guangdong traded 1,395,806 tons of Guangdong Emissions Allowances (GDEA) at a value of US\$3,427,962, representing 17.75% of total volume and 10.88% of total value.
- 709,102 tons of GDEA were traded online, totaling US\$1,771,539. The online trading price between September and December was a little higher than during the compliance period, peaking at US\$3.03/ton on September 15.
- The volume and value of OTC trades were almost equal to online trading (686,704 tons traded at a value of US\$1,656,423)
- The volume and value of both online and OTC transactions were highest in September.
- Guangdong held auctions on September 21 and December 21 for 2015 allowances, with a total volume of 0.6 million tons and value of US\$1,430,000. The transaction price reduced from US\$2.48/ton to US\$2.31/ton, but was still higher than the online trading price on the same day.
- When its secondary market and auction transactions are considered, Guangdong had the highest trading volume (1,995,806 tons of GDEA) and value (USD\$3,496,962) among all markets.
- On September 17, the Guangdong DRC announced the Guangdong Allocation Scheme for 2015 Allowances. According to the scheme, auctioning is still applied, but for the first time the auction reserve price is set based on the recent market price instead of a fixed price. In addition, the allowance amount declared by enterprises must not be less than the total amount issued by the Guangdong DRC; otherwise the declarations will not be traded. The rules indicate that the auction price will be linked to the price in the secondary market (See Appendix 1).
- In addition, the amount of allowances for auctioning has sharply decreased, from 8 million tons in 2014 to 2 million tons in 2015.

Figure 7. Guangdong Carbon Market: Online Trading (September 1-December 31, 2015)



**Table 4. Guangdong Secondary Carbon Market Data**  
(September 1-December 31, 2015)

Time	Contract	Online Trading		OTC	
		Trading Volume (tons)	Trading Value (US\$)	Trading Volume (tons)	Trading Value (US\$)
September	GDEA	516,677	1,321,040	686,704	1,656,423
October		131,277	305,811	0	0
November		48,831	113,329	0	0
December		12,317	31,358	0	0
<b>Total</b>		<b>709,102</b>	<b>1,771,539</b>	<b>686,704</b>	<b>1,656,423</b>

**Table 5. Guangdong 2015 Allowance Vintage Auction Data**  
(September 21, 2015 and December 21, 2015)

Date	Auction Reserve Price (US\$/ton)	Available Quantity (million tons)	Transaction Volume (million tons)	Transaction Price (US\$/ton)	Transaction Value (US\$ million)
2015/9/21	1.98	0.3	0.3	2.48	0.74
2015/12/21	1.98	0.3	0.3	2.31	0.69

## Tianjin

Tianjin Pilot: September 1 – December 31, 2015	
Total Volume	14,200 tons
% of total volume of all 7 pilots	0.18%
Total Value	US\$50,656
% of total value of all 7 pilots	0.16%
Average price	US\$3.57/ton

### Highlights

- 14,200 tons of Tianjin Emissions Allowances 2015 (TJEA15) were traded online at a total value of US\$50,656. Fewer than 500 tons traded daily.
- Prices for TJEA15 ranged from US\$3.45 to US\$3.72, averaging US\$3.57/ton.
- The scale of the Tianjin carbon market continuously declined, reporting the lowest volume of trades among the pilot carbon markets. This is reflective of general weak interest in the market by local enterprises as well as a lack of enforced penalties for enterprises that fail to surrender allowances.

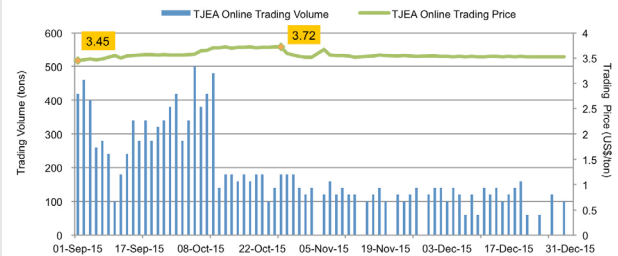
## Chongqing

Chongqing Pilot: September 1 – December 31, 2015	
Total Volume	9,217 tons
% of the total volume of all 7 pilots	0.10%
Total Value	US\$15,700
% of the total value of all 7 pilots	0.04%
Average price	US\$1.70/ton

### Highlights

- The Chongqing Carbon Emissions Trading Center traded 9,217 tons of CQEA (Chongqing Emissions Allowances) at a value of US\$15,700, accounting for 0.10% of the total volume and 0.04% of the total value traded, constituting the smallest share of the seven markets.
- The average trading price was US\$1.70, hitting the lowest level of all seven pilots.
- Trading on the Chongqing carbon market only took place on 7 days during this period.
- The Chongqing pilot still allocated 2015 allowances based on emissions as reported by covered entities. The Chongqing pilot is, therefore, not using the widely-accepted benchmarking or grandfathering approach for allocation.

**Figure 8. Tianjin Carbon Markets: Online Trading**  
(September 1-December 31, 2015)



**Table 6. Tianjin Secondary Carbon Market Data**  
(September 1 – December 31, 2015)

Time	Contract	Online Trading		OTC	
		Trading Volume (tons)	Trading Value (US\$)	Trading Volume (tons)	Trading Value (US\$)
September	TJEA15	6,400	22,594	0	0
October		3,560	13,074	0	0
November		2,100	7,444	0	0
December		2,140	7,545	0	0
<b>Total</b>		<b>14,200</b>	<b>50,656</b>	<b>0</b>	<b>0</b>

# Hubei

Hubei Pilot: September 1 – December 31, 2015	
Total Volume	3,441,935tons
% of total volume of all 7 pilots	43.77%
Total Value	US\$12,415,049
% of total value of all 7 pilots	39.39%
Average price	US\$3.61/ton

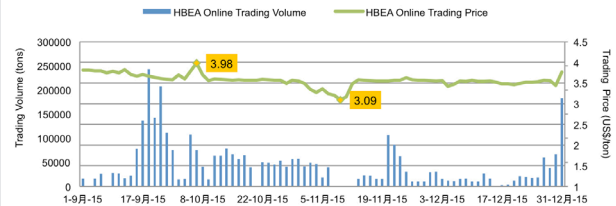
## Highlights

- The Hubei market did not publish any information about OTC trading between September and December; thus only online trading is reported here.
- Hubei traded 3,441,935 tons of emissions allowances at a total value of US\$12,415,049, which constituted the largest portion (43.77%) of the trading volume among all markets. Although Hubei had the largest volume, the value was less than that of the Shenzhen pilot because of its lower price.
- The online trading price ranged from US\$3.09 to US\$3.98, decreasing slightly compared with that during the compliance period.
- Hubei announced the allocation arrangement for 2015 emissions allowances on November 25, 2015, but the announcement had little effect on the market.
- Between September and December, trading was spurred by a rule that requires enterprises to return untraded surplus allowances to the government after each compliance deadline.
- The allocation plan for 2015 is broader than that used in 2014. In addition to power, the industries required to benchmark performance now also include cement, heat, and combined heat (See Appendix 1). The total number of enterprises covered expanded to 167 in 2015 from 138 in 2014. In addition, the Hubei DRC allocated both the 2015 and 2016 vintage allowances at once, meaning the pilot period in Hubei has been extended through 2016. This ensures there will be no gap between the conclusion of the Hubei pilot market and the launch of the national ETS in 2017.

**Table 7. Hubei Secondary Carbon Market Data**  
(September 1 – December 31, 2015)

Time	Contract	Online Trading		OTC	
		Trading Volume (tons)	Trading Value (US\$)	Trading Volume (tons)	Trading Value (US\$)
September	HBEA	1,357,460	5,004,219	0	0
October		843,186	3,013,970	0	0
November		604,749	2,111,600	0	0
December		636,540	2,285,260	0	0
<b>Total</b>		<b>3,441,935</b>	<b>12,415,049</b>	<b>0</b>	<b>0</b>

**Figure 9. Hubei Carbon Markets: Online Trading**  
(September 1-December 31, 2015)



# CCER Market

As of December 31, 2015, 1,240 Certified Emission Reduction (CCER) projects have been publicized for comments and 341 have been registered. Eighty-three projects have been issued, representing 25.04 million tons of CCERs. Wind, small hydro, solar photo voltaic, and forest carbon sink projects are most popular, likely due in part to the offset rules for CCER in the seven pilot carbon markets.

Among the 83 issued projects, there are 17 Type<sup>3</sup> I projects (4.35 million tons of CCERs issued), 3 Type II (0.64 million tCO<sub>2</sub>e emission reductions), and 63 Type III (20.05 million tCO<sub>2</sub>e). Type III projects breakdown further: 34 wind power (4.73 million tCO<sub>2</sub>e), 21 hydro power (8.98 million tCO<sub>2</sub>e), and 12 household biogas (1.51 million tCO<sub>2</sub>e), as well as a small amount of emissions reduction from other projects including waste heat power generation, biomass, and forest carbon sinks.

As of December 31, 2015, 32.47 million CCERs have been traded through the exchanges (Figure 12), among which Shanghai ranked first with trading of 24.65 million CCERs, accounting for three-quarters of the total volume. CCER transactions in Shanghai are the most frequent, taking place every week with a daily trading volume of more than 10,000 CCERs, though two markets – Hubei and Chongqing do not announce CCER trading information. According to the Shanghai Environment and Energy Exchange, CCER trading usually takes place OTC, investors are the main participants, and the average CCER price in Shanghai is US\$2.47/ton.

Figure 10. CCER Projects by Type (% of issued projects)

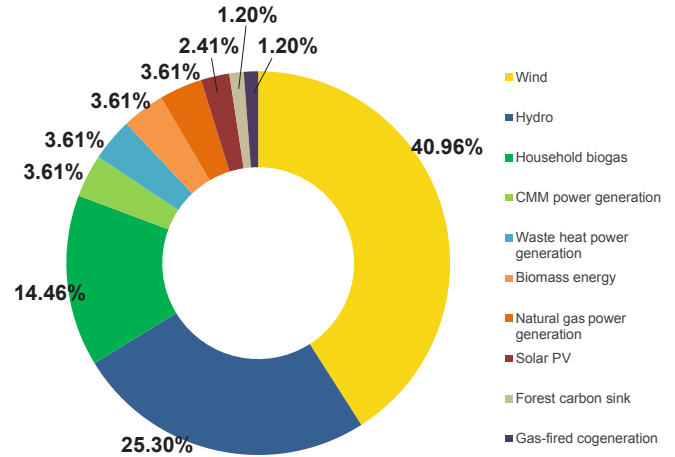


Figure 11. CCER Projects by Type (% of credits issued)

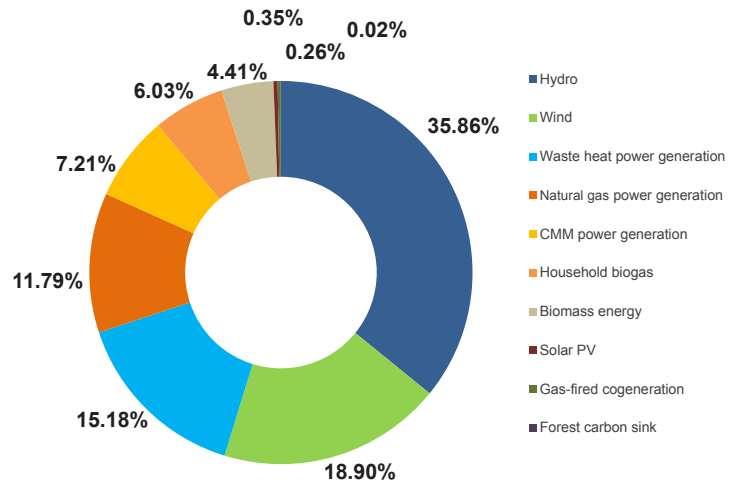
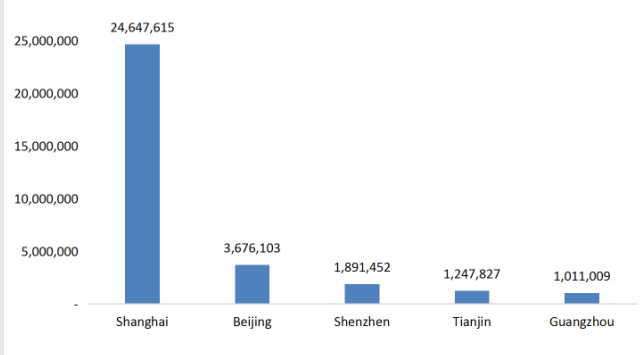


Figure 12. Distribution of CCER Trading Among Exchanges (tons CO<sub>2</sub>e)



<sup>3</sup> According to regulation on the management and operation of CCER projects issued by the NDRC, there are four categories of CCER projects. Category 1 refers to newly developed CCER projects. Category 2 refers to those projects which get a Letter of Approval from the Designated National Authority but are not yet registered at the CDM Executive Board. Category 3 refers to those registered CDM projects applying for issuance of emissions reductions generated before the date of registration, known as Pre-CDM projects. Category 4 refers to those registered CDM projects for which the CDM Executive Board never issued any emissions reductions.

# Policy Updates and Analysis

## NDRC Moves to Promote Development of National ETS

In order to ensure that the country is prepared for the launch of a national ETS by 2017, China's National Development and Reform Commission (NDRC) issued a landmark notice in January 2016 to local Development and Reform Commissions (DRCs), laying out the priority work to be done and a timeline over this course of 2016 for completion. The NDRC had previously tried to collect historical emissions data in the lead up to the launch of the national system. However, this effort stalled due to a lack of detailed technical guidance to DRCs, such as specific information about the scope of reporting (covered sectors and base years), reporting templates, third-party verification guidance and templates, and criteria for selecting third-party verifiers. The Notice clarifies these issues and NDRC has announced a technical help desk to support DRCs.

The Notice identifies four main tasks for local governments to complete in the run up to the national ETS launch: (1) compile an initial list of enterprises to be covered under the national ETS, (2) collect and verify covered enterprises' emissions data between 2013 and 2015, (3) train and select third-party verification organizations, and (4) strengthen capacity building among carbon market participants, DRCs, and third-party verifiers. There are two accompanying requirements of DRCs and state-owned enterprises (SOEs), namely that both should provide an institutional arrangement for ETS, and mobilize financial resources. This means that DRCs and SOEs (led by the State-owned Assets Supervision and Administration Commission) should establish working groups to support the design and implementation of the institutional arrangement for the national ETS at the local level. DRCs are also responsible to mobilize funds to finance activities such as third-party verification.

**(1) Scope of the national ETS:** according to the Notice, the national carbon market will cover the power sector (power generation, combined heat and power generation, and grid), petrochemical production (crude oil processing and ethylene production), chemical production (ammonia, carbide, and methanol production), building materials (cement clinker and plate glass production), crude steel production, nonferrous metals (electrolytic aluminum and copper smelting), paper making (pulp and paper production), and aviation (passenger air transport, air cargo transport, and airports). Enterprises in these sectors with total annual energy consumption of more than 10,000 tonnes of coal equivalent in any year from 2013 to 2015 will be included. Local governments are required to do thorough checks for such enterprises in the listed sectors in their jurisdictions, and submit an initial list of enterprises to be covered under the national carbon market to the NDRC for further confirmation by February 29, 2016.

**(2) Reporting template and base year:** the Notice lays out a requirement and process for local DRCs to finish historical emissions reporting and verification work by June 30, 2016, while providing guidelines and templates that are critical for getting the work done. NDRC asks that enterprises on the coverage list use the methods and templates provided in the Notice to report their GHG emissions and other necessary parameters for emissions

between 2013 and 2015. In order to facilitate the preparation of the national allocation plan, the Notice also requires that basic facility-level data be reported, and that covered enterprises are required to use the templates to submit such additional data.

**(3) Third-party verification:** the Notice further requires that all data submitted by enterprises must be verified by third-parties using the guidelines and template provided in the Notice. Local DRCs are responsible for selecting these verifiers based on basic requirements outlined in the Notice. Formal guidelines for third-party verification are expected to be issued by the national government at a later date.

NDRC has also established a data reporting and verification national technical Q&A platform, which includes a website and hotline. NDRC also plans to organize experts to provide unified answers to relevant questions from stakeholders relating to reporting and verification. As reporting and verification are advanced in parallel in each province, it is important to provide centralized guidance for the implementation and interpretation of the reporting and verification guidelines and templates. The platform provides a useful tool for ensuring that rules are implemented consistently, and that "a ton is a ton" across all provinces.

The Notice is the most comprehensive and specific guidance the NDRC has provided to date. It is based on experience gained and feedback received from the pilot markets, and provides an important tool to facilitate work at the provincial level and to engage industry.

NDRC is helping Chinese SOE prepare for emissions trading in other ways as well. In January 2016, the International Emissions Trading Association (IETA), through its Business-PMR (BPMR) platform and on invitation from NDRC, hosted more than 50 Chinese SOEs and another 30 international companies to discuss emissions trading. The first-of-its-kind event allowed representatives from companies familiar with emissions trading to share lessons and experience with the Chinese companies, which represented various sectors, including power, petrochemical, aviation, iron & steel, cement, and pulp & paper. Discussions focused on success factors for emissions trading participation, allowance management strategies, and the use of project-based credits. The event also features an ETS simulation.

### Notes on the sources and methodology used in this report

1. Among the seven carbon emissions trading pilots, only Guangdong has used auctioning to distribute part of the allowances to regulated entities (i.e., the primary market). Therefore, the China Carbon Market Monitor only reports on allowances changing hands once they have already been distributed through free allocation or auctions (i.e., through the secondary market). In the seven carbon emissions trading pilots, such transactions can only take place on the officially designated trading platforms (i.e., the "exchanges") with participants trading either online on an anonymous basis,



or OTC where traders agree on a quantity and a price for the allowances, and then register and clear the deal with the trading platform.

2. Online trading information (i.e., daily trading volume, value, and average price) is publicly available for all seven pilot markets. However, the availability and modality of publication of OTC trading data varies: Shanghai and Tianjin publicly report data for all OTC transactions; Guangdong, Beijing, and Shenzhen publicly report OTC transactions on an aggregated basis, and thus values are determined using online trading data; in Hubei, daily OTC transaction data was not released but monthly data were available on the official website of the Hubei Emissions Exchange.

3. As of December 31, 2015 data on the CCER project pipeline, registration, and issuance is officially publicized by China Certified Emission Reduction Exchange Info-Platform, which is the official website for CCER project information. Data on CCER trades come from public announcements made in the press and by market players in the respective markets.

4. Availability of allowances for trading is determined by the respective pilots' allocation plans. Shanghai allocated allowances for three years (2013, 2014, and 2015) at once. Shenzhen and Tianjin allocate allowance vintages every year. Beijing and Guangdong allocate allowances each year but do not distinguish between vintages. For the purposes of this report, BEA and GDEA, therefore, correspond to all Beijing Emissions Allowances and Guangdong Emissions Allowances from 2013 to 2014. Chongqing allocated allowances for 2013, but does not intend to distinguish between vintage years. CQEA-1 is the Chongqing Emissions Allowance valid for the whole pilot phase, from May 28, 2014 to December 31, 2015. Hubei allocated allowances for 2014, but will not use vintages; therefore, HBEA is the corresponding Hubei Emissions Allowance for the pilot phase, from April 2, 2014 to December 31, 2015.

5. A CNY/US\$ exchange rate of 0.16 was used in this report.

#### Appendix 1. Overview of Allocation Approaches in the Chinese

ETS Pilots	Free Allowances			Allowances for Auctioning
	FREE ALLOCATION			AUCTIONING
	Benchmarking	Grandfathering	Share of total allocation	
Shenzhen	Part of power generation, Natural gas, Water supply, Manufacturing	Other part of power generation	100%	N/A
Shanghai	Power generation, Aviation, Airports, Ports	Other industries	100%	N/A
Beijing	New facilities	Existing facilities	100%	N/A
Guangdong	Power generation and coal-fired thermoelectric cogeneration, Cement clinker production and grinding, Long-process iron and steel	Gas-fired thermoelectric cogeneration, Mining and micro powder grinding of cement industry, Special cement production, Short-process iron and steel, Other iron and steel enterprises	Power generation: 95% Iron and steel, petrochemicals, cement: 97%	8 million tons in 2014; 2 million tons in 2015; prices similar to secondary market
Tianjin	New facilities	Existing facilities	100%	N/A
Hubei	Cement, Power generation, Heat, Cogeneration	Other industries	100%	N/A
Chongqing	Based on annual emissions that enterprises report		100%	N/A

Appendix 2. CCER Rules Adopted in Various Pilots

Pilot	Type of Offset Credit	Rules of Use	Location Restriction	Time and Types Restriction
Shenzhen	CCER	No more than 10% of the annual emission	----	CCERs must come from existing or planned renewable or nuclear energy projects, clean traffic projects, marine carbon sequestration project, forestry carbon sequestration project, agricultural emissions reduction project
Shanghai	CCER	No more than 5% of the total allowance	CCERs from the projects in the covered entity boundary cannot be used	Only CCERs generated after January 1, 2013
Beijing	CCER; validated emission reductions from energy conservation projects and forestry carbon sequestration projects	No more than 5% of the annual allowance	Up to 50% of the annual CCER quota may come from projects located outside of Beijing, with priority to projects located in cooperation areas, including Hebei province and Tianjin City	CCERs must come from projects that began operation after January 1, 2013; excluding CCERs from HFCs, N <sub>2</sub> O, SF <sub>6</sub> , and hydropower projects. Forestry carbon sequestration projects should start after February 16, 2005
Guangdong	CCER	No more than 10% of the annual emissions	At least 70% of CCERs should come from projects located in Guangdong Province	50% from CO <sub>2</sub> and CH <sub>4</sub> reduction projects; exclude CCERs from hydro power, fossil fuel (coal, oil, and gas) power generation, heating and waste energy projects; exclude CCERs from pre-CDM projects
Tianjin	CCER	No more than 10% of the annual emissions	CCERs from Beijing, Tianjin and Hebei should be given priority. CCERs from the projects located in the covered entity boundary of Tianjin and other pilot province and cities cannot be used	CCERs from pre-CDM projects and hydro power projects are not allowed
Hubei	CCER	No more than 10% of the annual allowance	100% of CCERs should come from projects located in Hubei Province	CCERs can only be from small hydro power projects