

The Latest Progress of Emissions Trading Schemes in Japan, China and the Republic of Korea

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Executive Summary:

The purpose of this issue brief is to provide an overview of the latest movement of the emissions trading scheme (ETS), with a focus on the three key Asian carbon markets in Tokyo, China (esp. the pilots) and the Republic of Korea (hereinafter abbreviated as Korea). The key findings are as follows:

- As of 2017, the global share of emissions covered by carbon pricing policies, including ETS, in Japan, China and Korea accounts for 1.85%, 2.62% and 0.84%, respectively. If China is able to launch its national ETS successfully by the end of 2017, thereby scaling up from the pilot schemes, then the share of emissions covered by ETS globally would increase to 22% due to China's contribution.

Tokyo ETS: Remarkable reductions achieved

- All the targeted facilities, consisting of around 1,300 offices and branches, have achieved their required reduction targets (between 6% and 8% depending on the sector), and over 90% of them have reduced emissions beyond their initial targets during the first compliance period between fiscal year of 2010 and 2014.
- 9% of the targeted facilities (124) have traded a total of 0.19 Mt-CO₂ credits to meet their obligations, and 60% of the traded credits between the facilities belonging to the same corporate groups were free of charge.

China Pilot ETSS: Smooth operation of six pilot markets

- By the end of 2016, seven pilots have completed their compliance performance review for the companies that are required to achieve CO₂ reduction targets. Almost all the companies in six pilots have fulfilled their obligations. Among these pilots, the best performer was Shanghai pilot ETS with all the targeted companies having achieved their reduction targets, while the worst performer was Chongqing pilot ETS, with only 70% of the companies under the pilot having met their targets in 2014.
- The market size has been growing at an impressive pace between 2013 and 2016. The annually overall trading volume has reached 344 Mt-CO₂, and the volume of trading at the futures market was 257 Mt-CO₂, accounting for 75% of the total trading volume in 2016.

- China is planning to launch its national ETS in 2017. The national ETS is anticipated to cover more than 7,000 industrial companies, with total emissions of about 4-5 billion t-CO₂, equalling around half of the country's total emissions.

Korea ETS: Significant progress in the first compliance year

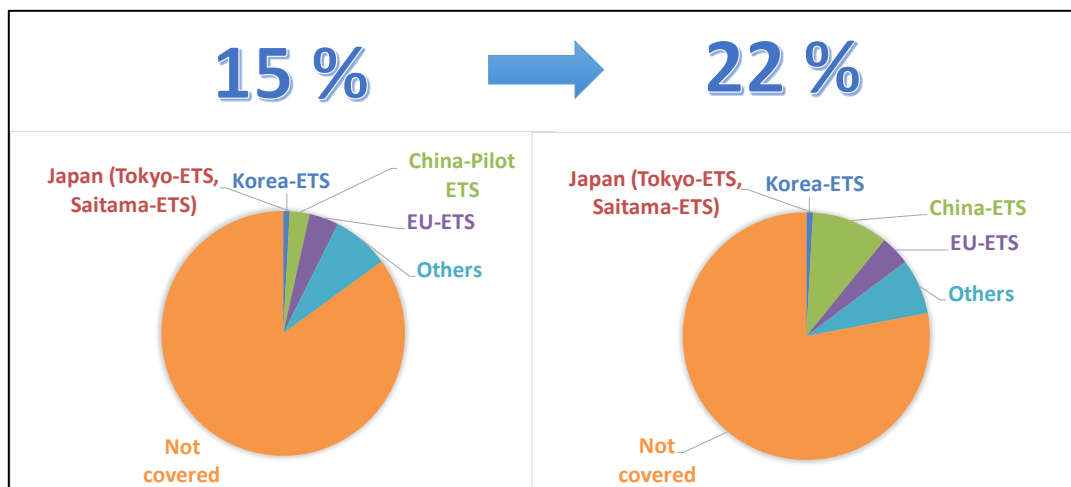
- Although the Korean ETS has faced many difficulties immediately after the start of market running in 2015, the evaluation has shown a positive market performance. Only one company failed to reach its reduction target.
- The volume of transactions doubled from 5.8 Mt-CO₂ in 2015 to 10.09 Mt-CO₂ in 2016.
- In order to meet the reduction targets, 239 regulated facilities (46% of all the regulated) have used allowances and credits, with an amount of 2.9 Mt-CO₂ in total.

1. Introduction

In 2015, world leaders adopted the remarkable Paris Agreement in Paris, at the 21st Conference of the Parties (COP 21) under the United Nations Framework Convention on Climate Change (UNFCCC). The main aim of the Paris Agreement is to hold the average global temperature rise below 2 °C and pursue 1.5 °C above pre-industrial levels. Under the Paris Agreement, the 197 Parties are requested to outline the post-2020 climate actions that they intend to take (UNFCCC, 2016a), known as Intended Nationally Determined Contributions (INDCs) which are regarded as the “backbone of the climate agreement”(UNFCCC, 2016b). Among the 181 submitted INDCs up to April 2016, 122 have indicated the use of market mechanisms to price greenhouse gases (GHG) emissions (IGES, 2016). According to the World Bank (2017), as of March 2017, over 40 national and 25 subnational jurisdictions have introduced ETS or/and carbon taxes. In total, these existing carbon pricing systems cover 8 Gt-CO₂e or 15 % of global emissions thanks to the rapid increase of related initiatives and schemes in the last five years (WB, 2017).

Asian countries have been contributing to this positive trend, and rapidly growing markets in Asia may be signalling a new era of low-carbon development in the region. The region’s first ETS was launched by the Tokyo Metropolitan Government in 2010, followed by Korea’s national ETS in 2015. China has been implementing several pilot projects to prepare for the full-scale national ETS by the end of 2017. It is estimated that, if China is able to launch its national ETS successfully this year, the total share of emissions covered by ETS will increase from 15% to 22% globally (see Figure 1).

Figure 1: Share of global emissions covered by ETS.



Source: World Resources Institute (2017) “Carbon Pricing Watch 2017”, WB.

Against this background, this issue brief aims to provide an overview of the ETS, and looks at the latest progress of each market in Tokyo, China (esp. pilots) and Korea.

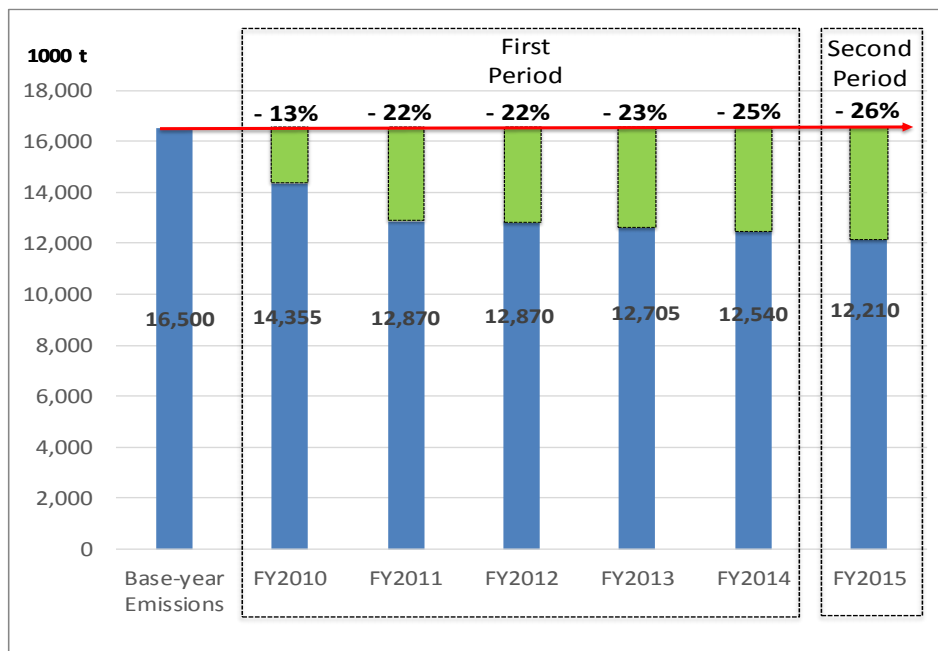
2. Tokyo ETS: Led to remarkable reductions in the first period

In April 2010, the Tokyo Metropolitan Government launched its city level Cap-and-Trade Program (Tokyo ETS hereinafter). This was the first ETS in Japan as well as in Asia. Tokyo ETS was developed after the successful implementation of the “Program for Reporting on Measures against Global Warming” introduced in April 2002 (IETA, 2015). Under this program, large-scale office buildings and factories are required to report and submit their emission reduction plan, including circulated emissions and a reduction target with related measures. Since 2005, the methods of administrative guidance/advice and the mechanisms of evaluation were added to improve the effectiveness of the programme. In the course of implementation of the program, the Tokyo Metropolitan Government accumulated high-quality emissions data and trained government officials to enhance their energy saving and management capability.

Under the Tokyo ETS, those large offices and factories that consume energy in excess of 1,500 kl of crude oil equivalent or more per year were required to reduce emissions by either 6% (for commercial buildings, district cooling & heating facilities) or 8% (for commercial buildings using district heating and cooling) during the first period (between 2010 and 2014). In 2015, Tokyo ETS entered its second period of implementation, and the required levels of reductions increased to 15% and 17%, respectively.

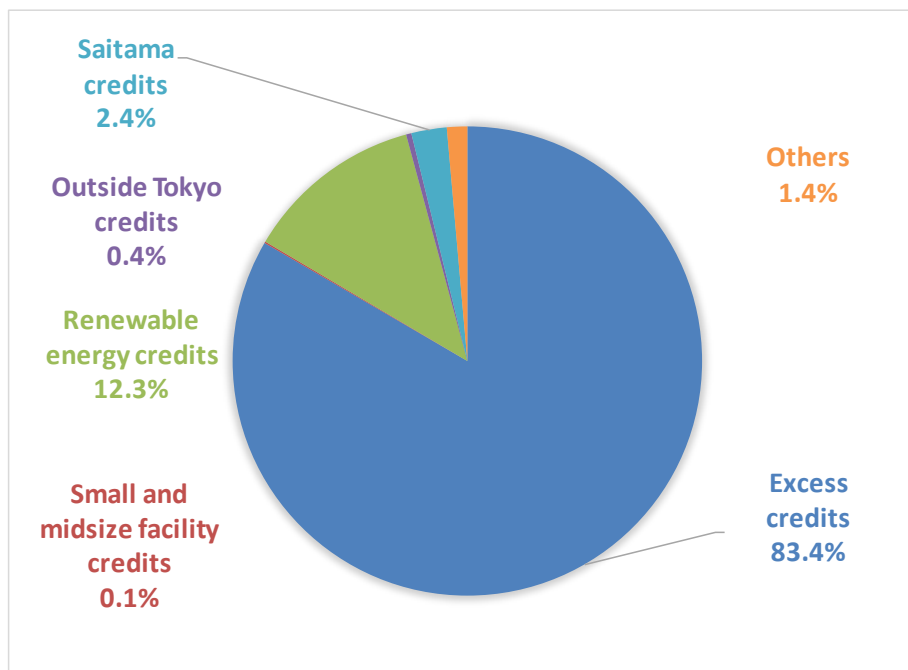
According to the report published by the Tokyo Metropolitan Government, total emissions have been reduced every year during the first period, and the accumulated emission reductions amounted to 14 Mt-CO₂ in total (TMG, 2016b). The total emissions of covered facilities were reduced by 25% in 2014 and 26% in 2016, in comparison with the base year emissions (see Figure 2). In fact, during the first compliance period between 2010 and 2014, all targeted facilities, consisting of 1,300 offices and branches, met their required reduction targets (between 6% and 8% depending on the sector), and over 90% of them reduced emissions beyond their initial targets. Moreover, 76% of facilities had already reduced their emissions beyond the second-period targets (15% or 17%) (TMG, 2016a). As a conclusion to the review report in 2015, Tokyo Metropolitan Government claimed that, “facility owners in Tokyo can see the long term benefits of reducing energy use and have already taken steps to realise those goals” (TMG, 2015).

Figure 2: Result of GHG emission reduction in Tokyo ETS.



Source: TMG, 2017a. The achievement of first year in second period (in Japanese), TMG.

Figure 3: Distribution of the type of credits used to meet obligations in the first period

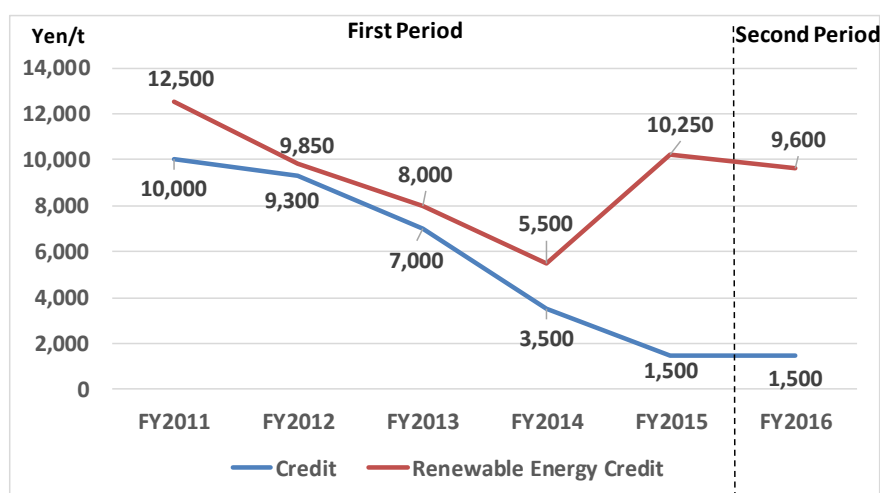


Source: Bureau of Environment of Tokyo Metropolitan Government, 2016b. Tokyo-Cap-And-Trade Program: All targeted facilities achieved their target in the first period.

To promote GHG reductions, the Tokyo Metropolitan Government provides five types of offset credits: excessive credits; small and mid-size facility credits; renewable energy credits; outside Tokyo credits and Saitama credits. It is important to mention that these allowances are not allowed to be exchanged in Tokyo-ETS, except for the extra emission reductions that are approved by Tokyo Metropolitan Government, so-called extra credits. There are 124 targeted facilities, or 9%, that have traded credits of 0.19 Mt-CO₂ in total to meet their obligations, and 60% of the credits traded between facilities belonging to the same corporate groups were free of charge (TMG, 2016b).

Tokyo ETS has no trading platform, so all transactions were carried out using case-by-case negotiations between the trading participants without any obligation to report transaction prices. The average transaction price of extra credits and renewable energy credits was published by the Tokyo Metropolitan Government based on their surveys. This shows that the average transaction price of excess credits fell from JPY10,000 /ton in 2011 to JPY1,500 /ton in 2016 due to oversupply (see Figure 4).

Figure 4: Average price of excessive credits and renewable energy credits during FY2011-FY2016.



Source: Bureau of Environment of TMG, 2017b. “The assessment result for transaction price” (in Japanese), *TMG*.

3. China ETS to become the world largest carbon market

In 2011, one year after the Tokyo Cap-and-Trade Program was launched, the National Development and Reform Commission (NDRC) of China published the “Notice on Carbon Emissions Trading Pilots”, with a decision to develop pilot ETSs in seven

provinces and cities, namely Beijing, Tianjin, Shanghai, Chongqing, Shenzhen, Guangdong and Hubei (NDRC,2011). At present, there are already 3,295 entities covered by eight pilot ETSs with a total emissions allocation of 1.27 billion tons (an additional pilot ETS was introduced in Fujian province on 30 September 2016) (WB, 2017).

By the end of 2016, the seven initial pilot projects completed their compliance performance review for the companies that are required to achieve CO₂ reduction targets. Almost all companies in six of the pilots fulfilled their obligations (see Table 1). Among the pilot projects, the best performer was Shanghai pilot ETS with all the targeted companies having achieved their reduction targets, while the worst performer was Chongqing pilot ETS, with only 70% of the participating companies having met their targets in 2014. Although there is no official data regarding the total amount of reduction effects on pilot ETSs, the Exchange Center (EC) reported that Shenzhen pilot ETS contributed to a reduction of 3.57 Mt-CO₂ of emissions in 2013 compared to 2010 (Shenzhen Exchange Center, 2015). The World Resources Institute (WRI) also pointed out that the introduction of a pilot project in Beijing helped reduce CO₂ emissions by 0.41 Mt-CO₂ in 2013, 1.56 Mt-CO₂ in 2014, and 2.90 Mt-CO₂ in 2015 (Zhu and others, 2015).

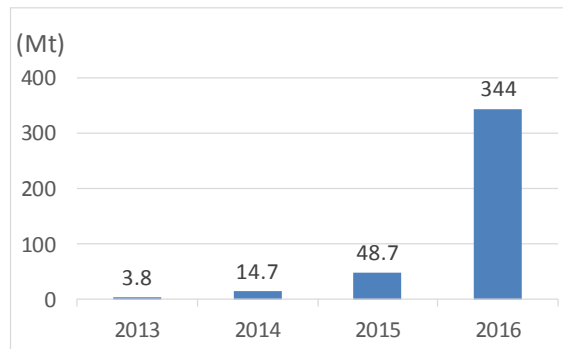
Table 1. Compliance performances of pilot ETSs in China (2014-2015)

Place	2014 (%)	2015 (%)
Shenzhen	99.4	99.7
Beijing	97.1	100
Guangdong	98.9	100
Tianjin	96.5	99.1
Shanghai	100	100
Hubei	81.16	100
Chongqing	70	NA

Calculated by the author using annual reports from exchange of Beijing, Shanghai (in Chinese).

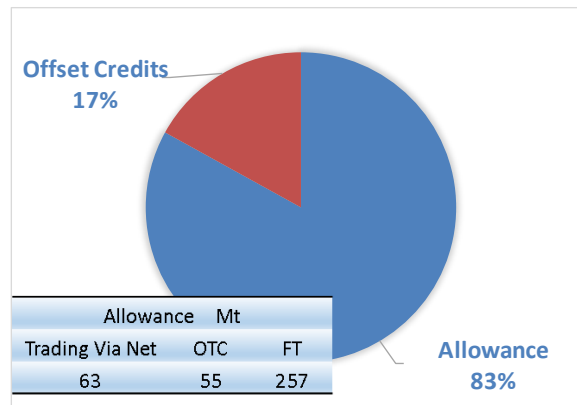
Figure 5 illustrates the impressive growth of the pilot market volume between 2013 and 2016. The annual overall trading volume reached 344 Mt-CO₂, and it grew seven-fold from the previous year. The volume of trading on the futures market was 257 Mt-CO₂, accounting for 75% of the total trading volume in 2016. By the end of June 2017, accumulative trading volume and market value had continuously increased to 446 Mt-CO₂ and CNY10.07 billion, respectively.

Figure 5: Annual market volume of China pilot ETSs (2013-2016).



Source: Calculated by the author using monthly reports from Hubei Emission Exchange.

Figure 6: Distribution of market volume by the type of credits during 2013-2016.



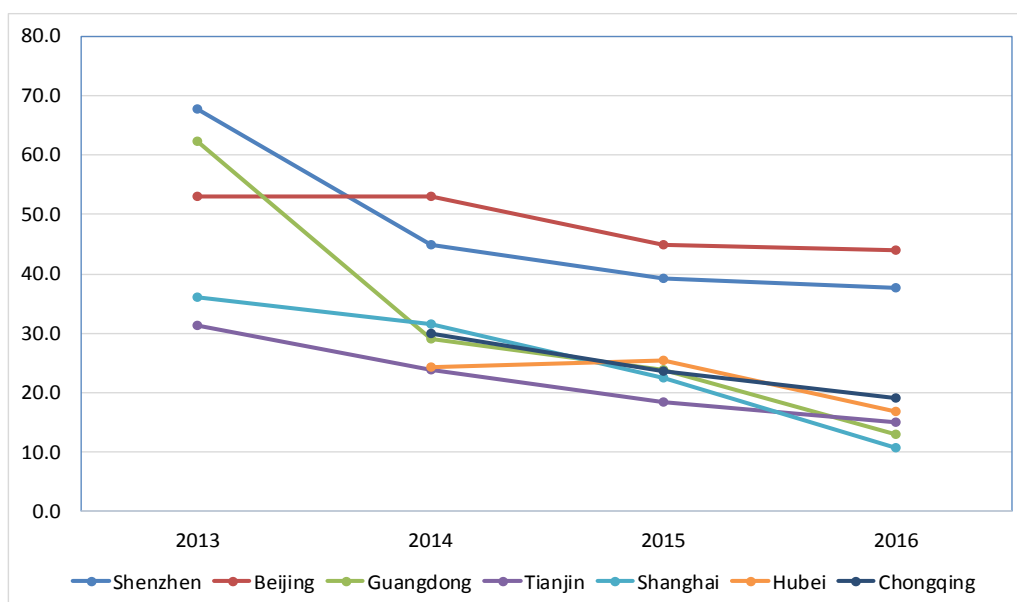
Source: Calculated by the author using monthly reports from Hubei Emission Exchange.

Figure 7 shows that the average price of allowance for all the Chinese pilot ETS markets has been dropping between 2013 and 2016. All pilot ETS markets experienced a large price decrease during the first year but started to stabilise gradually from the second year. What is common across the pilot markets is that trading is typically concentrated in the three months before the compliance deadline, accompanied by a sharp rise in price. For example, after the market opened in 2013, the Shenzhen market experienced a dramatic price fluctuation. The allowance price was CNY 30/ton in October 2013, which tripled over three months and then dropped steeply thereafter.

From the fourth quarter of 2016, Hubei, Shanghai and Guangdong markets have shown a strong price recovery with increasing transactions, thanks to the changes in market sentiment since 2015, whereby market experts have regained more confidence in the ability to bank the pilot allowances to the national market (Environomist, 2017).

China is planning to launch its national ETS this year, which covers eight energy-intensive sectors, namely petrochemical, chemical, building materials, iron & steel, non-ferrous metal, papermaking, power generation and aviation industries. The national ETS targets more than 7,000 industrial companies and aircraft operators whose annual energy consumption is more than 10,000 tons of standard coal in any year during 2013-2015 (CEEP, 2017). It covers about 5 billion tons of CO₂ or half of national overall emissions, leading China to become the biggest carbon market in the world. During the period of 2013-2016, China gained extensive experiences through its pilot projects and policymakers are now ready to launch the national ETS in 2017.

Figure 7: Average price of allowance in China (2013-2016).



Source: Calculated by the author using annual reports from exchange of Beijing, Shanghai (in Chinese).

4. Korean ETS: Significant progress in the first year

On 1 January 2015, Korea launched a national ETS as the first nationwide cap-and-trade program in Asia. This scheme covers the 602 largest emitters in Korea (FMS, 2017), including five domestic airline operators in the first compliance period of 2015-2017, which accounts for around 68% of the national GHG emissions (WB, 2017).

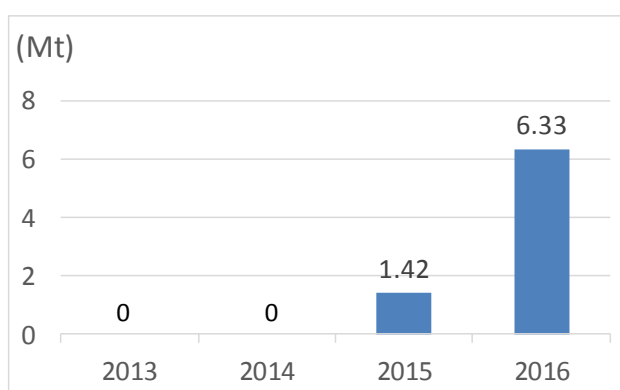
After opening the market, Korean ETS has faced many difficulties. For example, there was no trading on the scheme for 2.5 months after the market opened (Lee, 2015). In addition, the Korean government faced three filed class action lawsuits from 45

companies, especially from the petrochemical and nonferrous metal sectors, who were against the government decision on the allocation of allowances (Lee, 2015).

To improve the situation, the government has attempted to improve the situation by increasing the supply of allowances and reducing the burden on companies. Firstly, that companies are allowed to borrow double of the amount of the share (from 10% to 20%). Secondly, an additional 0.9 Mt allowances were released from the Allowance Reserve to the market in June 2016. Thirdly, in February 2017, an additional 51.391 Mt allowance were distributed to companies that have already implemented the reduction efforts before the launch of ETS (KEA, 2017). Lastly, 17.014 Mt allowances were added to 15 industries after the revision of national reduction target (KEA, 2017).

Regardless of the struggles surrounding the Korean ETS, the evaluation of the scheme has shown a positive market performance. It showed that only one company failed to reach its reduction target (FSM, 2017). In order to meet the reduction targets, 239 regulated facilities (46% of the total) have used allowances and credits, which amounted to 9.8 Mt in total in 2015 (Park Byung-ry, 2017).

Figure 8: Annual market volume of Korean ETS (2015-2016).



Source: Ministry of Strategy and Finance of South Korea, 2017. Basic Plan for the Second Period of Emissions Trading Scheme (Draft).

Table 2: Breakdown of annual market volume in Korean ETS

Year	Volume/Average price	Total	Allowance	Credit Unit	Offset Credit
2015	Volume, Mt	5.833	0.498	0.921	4.414
	Average price, 1,000 won	10.81	10.1	12.25	10.09
2016	Volume, Mt	10.081	4.151	2.18	3.75
	Average price, 1,000 won	16.01	16.5	17.1	14.43

Source: Ministry of Strategy and Finance of South Korea, 2017. Basic Plan for the Second Period of Emissions Trading Scheme (Draft).

By the end of 2015, transactions reached 5.8 Mt, and this amount doubled to 10.09 Mt in 2016 (see Figure 8). The total trading volume has reached 15.9 Mt, of which offset credits trading amount to 8.16 Mt or 51% of the total, Credit Unit make up 3.1Mt or 20%, and Allowances make up 4.64 Mt or 29% (see Table 2).

The average price in 2016 was KRW16.01 thousand per ton, which rose by 60% from 2015. The government perceives this as the consequence of supply-demand imbalances. In fact, the high price is one of the main reasons for that many companies are still dissatisfied with the Korean ETS.

After the government's announcement about introducing additional allowances in February 2017, the market has been positive. The monthly market volume grew to 2.67 Mt in March, five times larger than in February, and the average price of the allowance has decreased to KRW21,500, reducing by KRW24,300 from the previous month (Korea Exchange, 2017).

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Annex 1: Selected factsheet of China ETS

	Shenzhen	Beijing	Guangdong	Tianjin	Shanghai	Hubei	Chongqing	Fujian
Emission reduction target (By 2020/ compared to 2015)	50% reduction in carbon intensity(compared to 2005)	20.5% reduction in carbon intensity	20.5% reduction in carbon intensity	20.5% reduction in carbon intensity	20.5% reduction in carbon intensity	19.5% reduction in carbon intensity	19.5% reduction in carbon intensity	19.5% reduction in carbon intensity
Market opening date	18-Jun-13	28-Nov-13	19-Dec-13	26-Dec-13	26-Nov-13	2-Apr-14	19-Jun-14	30-Sep-16
Cap and trajectory	31.45 MtCO _{2e} (2015)	46 MtCO _{2e} (2016)	422 MtCO _{2e} (2016)	160-170 MtCO _{2e}	155 MtCO _{2e} (2016)	253 MtCO _{2e} (2016)	100.4 MtCO _{2e} (2016)	200 MtCO _{2e}
Emissions coverage	40%	0.45%	60%	55%	57%	35%	40%	560%
Carbon Price	CNY 36.00 (per t/CO _{2e})	CNY 53.66 (per t/CO _{2e})	CNY 13.18 (per t/CO _{2e})	CNY 19.00 (per t/CO _{2e})	CNY 7.14 (per t/CO _{2e})	CNY 16.39 (per t/CO _{2e})	CNY 10.00 (per t/CO _{2e})	CNY 31.6 (per t/CO _{2e})
Regulated gases	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆	CO ₂
Covered Sectors	Power, water, gas, manufacturing sectors, buildings, port and subway sectors, public buses and other non-transport sectors.	Electricity providers, heating sector, cement, petrochemicals, other industrial enterprises, manufacturers, service sector, and public transport.	Power, iron and steel, cement, and petrochemicals, aviation, paper, white cement (Reporting sectors: ceramics, textiles, non-ferrous metals, and chemicals)	Heat and electricity production, iron and steel, petrochemicals, chemicals, exploration of oil and gas.	Airports, aviation, chemical fiber, chemicals, commercial, power and heat, water suppliers, commercial, hotels, financial, iron and steel, petrochemicals, ports, shipping, non-ferrous metals, building materials, paper, railways, rubber, and textiles.	Power and heat supply, iron, steel, non-ferrous metals, petrochemicals, chemicals, chemical fiber, cement, glass, building materials, pulp and paper, ceramic, automobile and general equipment manufacturing, food, beverage and medicine producers.	Power, electrolytic aluminum, ferroalloys, calcium carbide, cement, caustic soda, and iron and steel.	Electricity, petrochemical, chemical, building materials, iron and steel, nonferrous metals, paper, aviation, and ceramics.
Thresholds	More than 3,000t CO _{2e} /year for enterprises; 20,000m ² for public buildings and 10,000m ² for government buildings.	More than 5,000t CO ₂ /year between 2009-2012	More than 20,000 t CO ₂ /year between 2011-2012	More than 20,000t CO ₂ /year considering both direct and indirect emissions during 2009-2012	More than 20,000t CO ₂ /year for industry and 10,000 CO ₂ /year for non-industry during 2010-2011	More than 10,000 tce/year in any year between 2013 and 2015 for the power, steel, non-ferrous, chemicals, petrochemicals, building materials and pulp and paper sectors and 60,000 tce/year for the rest of the sectors during 2010-2011	More than 20,000t CO ₂ /year during 2008-2012	More than 10,000 tons tce/year for any year between 2013-2015
Number of liable entities	824	947 (including 26 (inner Mongolia), 6 (Hubei))	280	109	368	236	254	277 (2016)
Compliance period	One year (30 June)	One year (15 June)	One year (20 June)	One year (30 June)	One year (1-30 June)	One year (1-30 May)	One year (20 June)	One year (30 June)
Allocation	97% of free allocation for three years	95% of free allocation for ever year	97% of free allocation for ever year		free allocation for three years	70% of free allocation for ever year	free allocation for ever year	free allocation for ever year
Banking and borrowing	banking: allowed Borrowing: not allowed.	Banking: allowed Borrowing: not allowed	Banking: allowed Borrowing: not allowed	banking: allowed Borrowing: not allowed.	banking: allowed Borrowing: not allowed.	Banking: allowed during the pilot phase, but only for allowances that were traded at least once. Borrowing: not allowed.	Banking: allowed Borrowing: not allowed	Banking: allowed Borrowing: not allowed
Offsets and credits	CCER limited to 10%	CCER limited to 5%	CCER limited to 10%	CCER limited to 10%	CCER limited to 1%	CCER limited to 10%	CCER limited to 8%	CCER limited to 5%
price management	reservation: 3% of total Price Fluctuation Limits: 10%	reservation: 5% of total Price Fluctuation Limits: 20%	reservation: 3% of total Price Fluctuation Limits: 10%	Price Fluctuation Limits: 10%	Price Fluctuation Limits: 30%	reservation: 30% of total Price Fluctuation Limits: 10%	reservation: 5% of total Price Fluctuation Limits: 20%	reservation: 10% of total

Source: World Bank Group (WB), 2017. "Carbon Pricing Watch 2017", WB

Annex 2: Selected factsheet of ETSs in Tokyo, China and Korea

	Tokyo-ETS	China-ETS Pilot Program	Korea-ETS
Starting date	2010/4/1	2013/6/18	2015/1/1
Trading period	2016-2019 (Second period)	2013-2017 (Phase one)	2015-2017 (Phase one)
Compliance period	Five years	One year	One year
Amount of GHG emissions covered by ETS (%)	13.5 MtCO ₂ e (2014)	1.27 GtCO ₂ e (2012)	472.3 MtCO ₂ e (2013)
Emissions covered by the ETS (%)	20% of Tokyo City emissions	35% - 60% for 8 regions or, 12% for national	68% of national emissions
Number of liable entities	1300	3295	602
Carbon price	9-13 US\$/ ton (Excess Credits)	2.7 US\$/ton (Allowance)	14 US\$/ton (Allowance)

Source: World Bank Group (WB), 2017. "Carbon Pricing Watch 2017", WB

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