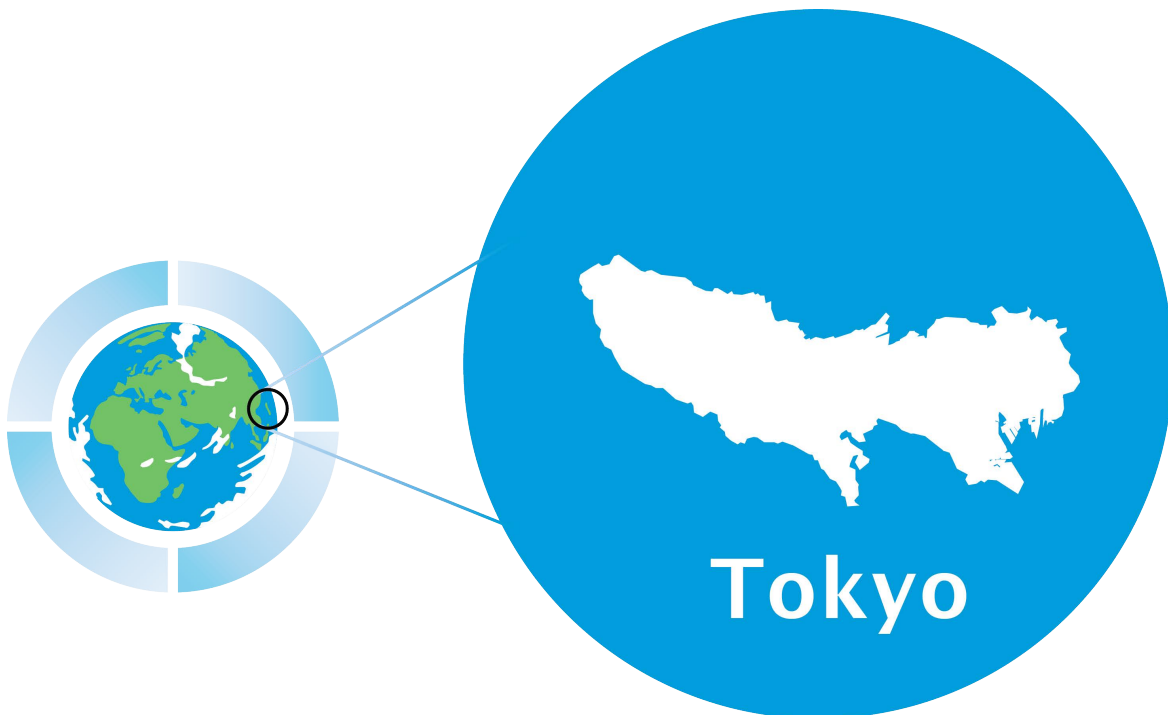




# TOKYO: AN EMISSIONS TRADING CASE STUDY



# Tokyo

## The World's Carbon Markets: A Case Study Guide to Emissions Trading

Last Updated: May 2015

Second Compliance Period (2015)	
Target	-25% by 2020 relative to 2000 level
Cap (million tCO <sub>2</sub> e)	10.8
Carbon price av	\$95 (2014)
Greenhouse gases covered	Carbon dioxide (CO <sub>2</sub> )
Number of Entities Covered	1232
Sectors Covered	office, commercial and public buildings, district heating and cooling plants
Threshold	1500 kl in crude oil equivalent
% total emissions covered	20%
Compliance tools & Flexibility Mechanisms	Free allowances, offsets, banking

**Table 1: Programme Overview**

### Brief History and Recent Developments

Year	Event
2000	Launch of the Carbon Emissions Reduction Programme
2002	Launch of Green Building Programme
2005	Revision of the Carbon Emissions Reduction Programme and launch of Phase II
2006	Tokyo announced GHG emission reduction target of -25% by 2020 relative to 2000 levels
2007	Tokyo Climate Change Strategy and Tokyo Metropolitan Environmental Master Plan approved
2008	Tokyo Metropolitan Environment Security Ordinance amended to officially establish the Tokyo Emission-trading-scheme
2010	Tokyo emission trading scheme officially launched

**Table 2: Key Dates**

Tokyo's metropolitan government (TMG) is the largest sub-national government in Japan and the largest jurisdiction in the world, covering 62 municipalities, which include cities, special wards, towns and villages.<sup>1</sup> The TMG governed 38 million people in 2014<sup>2</sup> and generated approximately one-fifth of Japan's GDP.<sup>3</sup> In 2012, Tokyo emitted 69.6million tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) of emissions,<sup>4</sup> accounting for 5.2% of Japan's total greenhouse gas (GHG) emissions.<sup>5</sup>

The city's top three high-GHG intensive sectors are commercial activities, which emit 37.4% (26 million tCO<sub>2</sub>e) of Tokyo's overall emissions, the residential sector, which is responsible for 30% (20.9 million tCO<sub>2</sub>e), and transportation, responsible for 17% (12 million tCO<sub>2</sub>e).<sup>6</sup> This dynamic has created an opportunity for the development of the Tokyo emission trading scheme (ETS) which was the first city-level ETS system to be implemented.

In the early 2000s, two major programmes were implemented that act as the basic framework of Tokyo's Climate Change policy: The *Tokyo CO<sub>2</sub> Emissions Reduction Programme* (CERP), and the *Tokyo Green Building Programme*.<sup>7</sup>

The CERP, introduced in April 2000 as part of the *Tokyo Metropolitan Environmental Security Ordinance*, required large-scale buildings and businesses in the industrial and commercial sectors (which use over 1500kl of crude oil equivalent annually) to report their emissions and emission reduction plans. Those large emitters identified for the mandatory reporting scheme were required to submit a five-year GHG emissions reduction strategy.

The programme has been revised twice since it began. First, in conjunction with the launch of Phase 2 in April 2005, the CERP introduced a mechanism that could inform emission reduction plans and provide guidance to covered facilities. Submitted plans would then be evaluated and made publicly available. Covered facilities received a rating based on a five-tier scale, and were required to reduce emissions accordingly (see table 3). The second revision took place in April 2010, concurrent to the launch of the Tokyo ETS, when the CERP was revised to cover small and medium-size facilities instead of large ones.

Tiers	Requirements
AA	>5% emission reduction planned through additional measures
A+	>2% emission reduction planned through additional measures
A	basic planned measures
B	only planned no-cost operational improvements
C	no planned basic measures or improvements

**Table 3: CERP tier scale**

Source: World Bank, 2010. Available at: [siteresources.worldbank.org](http://siteresources.worldbank.org)

The Tokyo Green Building Programme was introduced in June 2002 as an attempt to grow the market for energy-efficient, high-quality buildings in Tokyo. The system implements a rating and reporting system to measure buildings' environmental performance and also clarifies environmentally friendly options for businesses. In January 2010, the programme made it mandatory to consider the introduction of renewable energy.<sup>8</sup>

In December 2006, the TMG announced its GHG emissions reduction target of -25% below 2000 levels by 2020.<sup>9</sup> This led to the adoption of the *Tokyo Climate Change Strategy* and the *Tokyo Metropolitan Environmental Master Plan* in 2007.<sup>10</sup> The Climate Change Strategy proposes the implementation of several policies and measures over 10 years, including:

- a cap-and-trade system covering CO<sub>2</sub> emissions of large businesses;
- a programme for *Reporting on Measures against Global Warming* targeting small and medium-size businesses;

- creating and promoting new low-carbon business models.

After the approval of the Climate Change Strategy, and the amendment of the Tokyo Metropolitan Environmental Security Ordinance in June 2008, the Tokyo Greenhouse Gas Emission Trading System was officially created.<sup>11</sup> The CERP enhanced data collection and participant familiarity with cap and trade, providing Tokyo with the necessary capacity to enact an ETS that entailed mandatory caps in April 2010.<sup>12</sup>

## Summary of Key Policy Features

**CAP:** The Tokyo ETS uses an absolute cap set at the facility-level, which means that the Tokyo-wide cap can be defined as the sum of all the covered facility-level caps. The ETS is composed of three five-year compliance periods, with Phase I spanning fiscal year 2010 to fiscal year 2014, and the second period from fiscal year 2015 to fiscal year 2020.<sup>13</sup> The base year is the average CO<sub>2</sub> emissions from any three consecutive years between 2002 and 2007 that a covered entity selects.<sup>14</sup>

**First compliance period (2010-14):** The cap required different emission reduction targets (compliance factors) among the covered facilities. These targets required an 8% reduction from office buildings,<sup>i</sup> district heating and cooling plants and, a 6% reduction for facilities that use at least 20% of energy from district heating and cooling plants, factories, water and sewage facilities and waste processing facilities.

**Second compliance period (2015-19):** Businesses are facing a 17% reduction and industrial facilities a 15% reduction, relative to the base year.

**Third compliance period (2020-22):** The target is yet to be determined.

Projections foresee a cap of 10.44 million tCO<sub>2</sub> in 2020, 9.7 million tCO<sub>2</sub> of which will cover existing facilities and the remainder for new entrants.<sup>15</sup> The ETS legislation provides an extra incentive to reduce emissions by defining the concept of “*top-level facility*”<sup>16</sup>, by certifying those businesses and facilities that make significant progress to reduce their emissions and meet the ETS requirements. Facilities can apply for a “*top-level facility*” application at the end of September each year. Certified facilities receive lower compliance factors in accordance with their rate of progress. The reduced compliance factor is to be applied from the second compliance fiscal year and will be effective for the duration of the current compliance period. If the progress of a certified facility declines, its certification will be cancelled or downgraded. There are two categories of certification and benefits:

- Outstanding progress: a facility’s compliance factor is reduced to half;
- Excellent progress: a facility’s compliance factor is reduced to three-quarters.

**SCOPE & COVERAGE:** The Tokyo ETS covers 40% of the industrial and commercial **sectors’** CO<sub>2</sub> emissions, which equates to **20% of all of Tokyo’s CO<sub>2</sub> emissions**. The ETS covers both indirect and direct CO<sub>2</sub> emissions from the use of energy (electricity, city gas, heavy oil, heat and other energy). The **point of regulation** is at the facility level. Covered entities include office buildings, commercial buildings, educational facilities, medical facilities, art facilities, public facilities (such as gymnasiums, public bath, jails, funeral halls, social welfare facilities), district cooling/heating plants, factories, water and sewage facilities and waste processing facilities<sup>17</sup> which consume at least 1500kl in crude oil equivalent (COE) annually. As of 9 January 2015, 1,232 facilities had reporting obligations under the ETS.<sup>18</sup>

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<sup>i</sup> Office buildings are sales offices, government buildings, department stores, restaurants and other shops, lodging facilities, educational facilities, medical facilities, social welfare facilities, information and telecommunication facilities, art facilities, sport facilities, public facilities.

Facilities can be removed from the system, if their energy consumption in the previous fiscal year was below 1000kl, if energy consumption for the past three consecutive fiscal years was below 1500kl, or if facility operations cease or are suspended.<sup>19</sup>

**ALLOWANCE DISTRIBUTION:** The Tokyo ETS system freely distributes allowances at the beginning of each compliance period. Allowances for covered facilities are determined through grandfathering, based on past emissions. Base year emissions are calculated as the average of actual emissions over any three consecutive years between 2002 and 2007. These figures are then multiplied by the compliance factor (set by the TMG) and then by the length of the compliance period:

$$\text{Allocated allowances} = \text{Base-year emissions amount} * \text{Compliance Factor} * \text{five year}$$

The calculation of free allowances is different for **New Entrants**<sup>20</sup> using two allocation methodologies:

- *Based on past emissions:* only if the level of proposed emission reduction measures meets the Guideline for Certification of Operation Management in Facilities. The aim is to avoid a situation where potential entrants intentionally increase their emissions before entering the market in order to increase their allowance allocation. The methodology here uses the same equation as above.
- *Based on emission intensity standards:* applies to all other new entrants. Until 2020, there is a 0.74 million tCO<sub>2</sub> **allowance reserve** for new entrants.<sup>21</sup> The allowances are allocated according to the calculation below:

$$\text{Allocated allowances} = \text{emission activity index (depending on the floor area in m}^2\text{)} * \text{emission intensity standard (set by the TMG)}$$

**FLEXIBILITY & COST-CONTAINMENT PROVISIONS:** To comply, facilities can choose to reduce emissions at their facility or to reduce emissions by purchasing offset credits. There are five types of offset credits: excess emission reductions credits, small and midsize facility credits, renewable energy credits, outside Tokyo credits and Saitama credits. In addition, banking is allowed between compliance periods. Facilities which generate emission reductions to sell offset credits are required to apply for certification to the TMG before such credits can be issued.

#### *Offsets*

Excess credits:<sup>22</sup> When a covered facility reduces emissions by more than its compliance obligation, it can apply for credit issuance within a given period after the emissions are determined. In this instance, the facility can sell its excess credits amounting up to one-half of its base year emissions. Excess credits were not allowed during 2010. Credits obtained during the first compliance period could be banked until the end of the second compliance period (but not to the third period). Only CO<sub>2</sub> emissions reductions are eligible.

Small and midsize facility credits:<sup>23</sup> When small and midsize facilities reduce their emissions through energy-saving measures below their base-year emissions, they can apply for emission reduction credits. The emission base year has to be one fiscal year out of the most recent three consecutive fiscal years before the measures are implemented. The issued credits are the difference between the baseline emissions and the amount of yearly emissions. There is no limit on the use of these credits. Credits can be issued for up to five years from when emission reduction measures were undertaken. Eligible measures are limited to measures completed in or after fiscal year 2005. In principle, applications are submitted according to a building's threshold; however, if energy use can be monitored separately, tenants could apply individually for credits.

Renewable energy credits:<sup>24</sup> Both local and national programmes to generate renewable energy and evaluate the emission reduction value are eligible. Depending on the source of renewable energy, the quantity of renewable energy certificates (REC) can vary. For electricity from wind, solar, geothermal and small-scale hydropower, one tonne of CO<sub>2</sub> reduction receives one-and-a-half (1.5) times the certificates as emissions reductions from other sources of renewable

energy. The use of RECs is unlimited. The REC is only eligible if the issued certificates indicate that their purpose is to be used in compliance with the Tokyo ETS.

Energy Source	Issued credits
Solar, wind power, geothermal power, hydropower (under 1,000kW)	1.5
Biomass power	1
Hydropower between 1,000 kW and 10,000kW	1

**Table 4: Amount of issued credits by types of renewable energy sources**

Source: TMG, Bureau of Environment, 2012. Available at: [kankyo.metro.tokyo.jp](http://kankyo.metro.tokyo.jp)

Outside Tokyo credits:<sup>25</sup> Emission reductions from energy-saving measures by large facilities outside the Tokyo area are eligible only if they do not negatively impact the reduction effort within Tokyo. Covered entities can use these credits for up to one-third of their compliance obligation if they meet the following two requirements:

- Emissions reductions come from a large facility outside Tokyo with a minimum energy consumption of 1500kl of COE in a base-year and with base-year emissions of 150,000 tCO<sub>2</sub>.
- The estimated total reduction rate must be at least 6% at the initial application and when applying for emission reduction certification.

Saitama credits: If Saitama Prefecture confirms that the reduction target has been achieved, then these credits can be used in the Tokyo ETS. The use of credits is unlimited as long as they are derived from facilities with base year emissions of at least 150,000 tCO<sub>2</sub>. Saitama credits from small and midsize facilities are limited.

### *High allowance prices*

In the event of high allowance prices, the basic approach is to increase the supply of credits available by using one of the following measures:<sup>26</sup>

- Increasing small and midsize facility credit supply;
- Increasing the supply of excess credits by “*promoting*” carbon reduction measures;
- “*Promoting*” renewable energy supply;
- Using the Solar Energy Bank; and
- Allowing mutual use of credits between the Tokyo ETS and Saitama ETS.

However, if supply remains scarce and excessive price evolution is foreseen despite the above measures, the eligible offset credits available for compliance would be expanded. TMG approval will be required. TMG could also sell credits (e.g. RECs issued from the Solar Energy Bank) at a uniform price auction or at a fixed price.

### *Banking and borrowing*

Unlimited **banking** is allowed between compliance periods, while **borrowing** is not allowed.<sup>27</sup>

## *Linking*

In April 2011, the Saitama ETS was launched and became simultaneously, linked to the Tokyo ETS. Within the two jurisdictions, excess credits and small and midsize facilities credits are eligible for trade. However, excess credits are confirmed at the end of the first compliance period, so these credits only became tradable from the second compliance period which began in 2015. In view of the Tokyo ETS' emphasis on buildings, linking with international systems like the EU ETS may be difficult in terms of framework compatibility.

## **MARKET REGULATION & OVERSIGHT:**

### *Monitoring & reporting*

Participants are required to submit an annual report of the previous fiscal year's emissions and their emission reduction plans by the end of November of the following year. The report includes not only CO<sub>2</sub> emissions but also covers five other gases (CH<sub>4</sub>, N<sub>2</sub>O, PFC, HFC and SF<sub>6</sub>). A verification report issued by a registered independent verification agency must be attached to the emission data report. Verification is mandatory at the following stages: reporting, applying for a top-level facility certification and when applying for offset credits. Annual emissions and actual reductions are publicised once per year on the TMG website. At the end of each compliance period, the governor checks the final status of the compliance obligation. If the total emissions reduction exceeds the obligation, the excess reductions may be carried over to the next compliance period as banked credit.

### *Registry<sup>28</sup>*

TMG is responsible for the maintenance and data management of the electronic registry. The registry includes three types of accounts: compliance accounts (to track emission reduction status of the covered facilities), trading accounts (to transfer credits) and surrender accounts (record credits surrendered for compliance). The registry is used to manage and record the trading of credits, and each capped facility, as well as brokers and entities that wish to participate (but are uncapped) must establish an account within the system.

### *Non-compliance & misconduct*

A facility can be accused of market misconduct<sup>29</sup> if it submits a fraudulent application, receives credits in the registry account through illegal actions or engages in actions that obstruct the TMG's investigations into submitted applications. If market misconduct is suspected, TMG will first provide guidance to the participant and later apply penalties if necessary. For example, in the case, of a fraudulent application determining baseline emissions, the fine can be up to JPY250,000 (US\$2,082).<sup>ii</sup>

In the case of non-compliance,<sup>30</sup> the facility will receive an order to reduce their emissions by the amount of the shortfall multiplied by 1.3. If facilities fail to meet this order, the violation will be published for public viewing and the facility will have to pay a fine of up to JPY500,000. In this specific case of failing to comply with the order, TMG purchases the reduction shortage and records them and registers that the reduction target has been fulfilled. Thereafter, the cost of TMG's purchase is billed to the facility. Once fines are settled, facilities must reduce future emissions as previously mandated.

**COMPLEMENTARY & SUPPLEMENTARY MEASURES:** The Tokyo ETS is a component within a larger Tokyo-wide programme to reduce CO<sub>2</sub> emissions. Within the larger programme, sectors have been assigned specific targets, for example, the transportation sector (-42%), the residential sector (-19%), and the industry/commerce sector (-17%). In December 2014, the TMG set a goal to decrease energy consumption 30% by 2030 relative to 2000 levels.<sup>31</sup>

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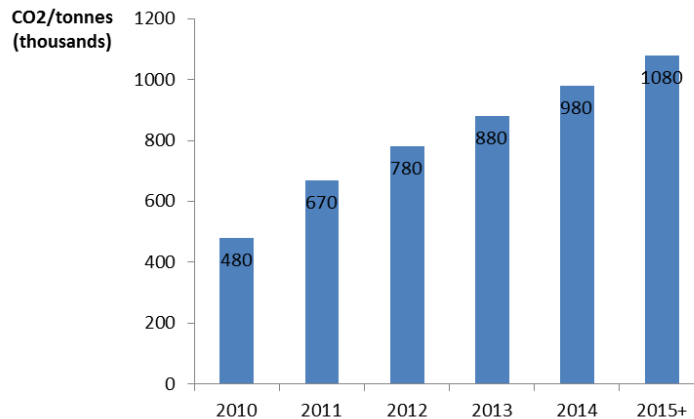
<sup>ii</sup> The exchange rate at the time of writing was 1 JPY = 0.00832887 USD (11/05/14)

**Carbon reduction reporting programme for small and medium-sized facilities:** There are about 690,000 small and medium sized facilities that consume less energy than the ETS threshold level; these account for about 60% of the total CO<sub>2</sub> emissions in Tokyo's commercial and industrial sectors. In 2008, the TMG established the aforementioned *Tokyo Carbon Reduction Reporting Programme* in order to help small and medium-sized facilities to reduce their CO<sub>2</sub> emissions and take specific climate change measures. On average 30,000 facilities submit emissions reports every year.<sup>32</sup>

**Green Building Programme<sup>33</sup> (GBP):** The programme, introduced in June 2002, applies to new buildings or extensions where the total floor area exceeds 5,000m<sup>2</sup>. The programme pioneered the creation of a rating and reporting system to measure environmental performance, and has spawned sister programmes, such as the *Green Labeling Programme for Condominiums* and the *Energy Certificate Programme*. To qualify for the GBP certification, buildings are required to be 20-30% more efficient than conventional buildings. In 2010, the programme increased its focus on climate change mitigation, and its energy efficiency standards are now above the national average.

**RESULTS:** The Tokyo ETS' first compliance period came to an end in December 2014 and achieved an emissions reduction of 23% compared to base year emissions during the four years.<sup>34</sup> In 2013, the accumulated CO<sub>2</sub> emission reductions were 880,000 tCO<sub>2</sub>, just below the planned accumulated emission reductions of 1.08 million tCO<sub>2</sub>.<sup>35</sup>

By February 2015, over 90% of covered facilities had surpassed their reduction targets for the first compliance period and 69% of facilities had already exceeded their second compliance period targets of 15-17% reductions.<sup>36</sup> More than 100 facilities have left the programme after reducing emissions below the threshold.<sup>37</sup>



**Figure 1: Accumulated ETS reductions (implemented/planned)**

Source: Tokyo Metropolitan Government, 2015. Available at: [kankyo.metro.tokyo.jp](http://kankyo.metro.tokyo.jp)

During the first compliance period, the majority of participants purchased excess credits and RECs to comply. According to a TMG survey released in November 2014, the estimated excess credit supply was 420,000 (73.7% of overall supply) and REC supply was 140,000 (24.6% of overall supply).<sup>38</sup>



Type	Issuance amount (10,000tCO <sub>2</sub> )	supply (10,000tCO <sub>2</sub> )	Supply (%)
Exceeding credits	927	42 (4)	73.7
Tokyo Small and midsize facility credits	11	0.3 (0.03)	0.5
Renewable energy credits (environmental value)	26	14 (12)	24.6
Outside Tokyo credits	10	1	1.8
Total	974	57 (16 contracted)	100

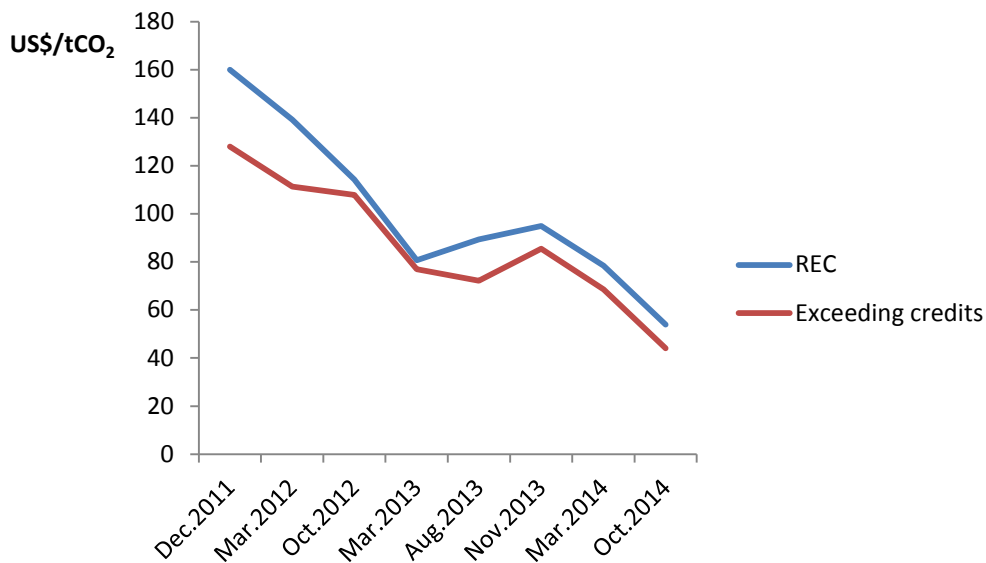
**Table 5: Estimated offset credit supply for the first compliance**

Source: Tokyo Metropolitan Government, 2014. Available at: [kankyo.metro.tokyo.jp](http://kankyo.metro.tokyo.jp)

According to another survey<sup>39</sup> carried out by the TMG in October 2014, the price ranges for these credits were:<sup>40</sup>

- JP¥5,000-6000 per tCO<sub>2</sub> for RECs.
- JP¥4,000-5,000 per tCO<sub>2</sub> for excess credits.

Their respective prices have been falling since December 2011.



**Figure 2: Credits price trends from December 2011 to October 2014**

Source: Tokyo Metropolitan Government, 2014. Available at: [kankyo.metro.tokyo.jp](http://kankyo.metro.tokyo.jp)

## What Distinguishes this Policy?

### UNIQUE ASPECTS

1. Tokyo was the first large-scale city to implement an ETS; it is the first local GHG ETS that focuses on commercial activities and the end-use of energy.
2. The Tokyo ETS includes coverage of large-scale **office buildings**.
3. The Tokyo ETS has **five-year compliance periods**. By contrast, the EU ETS and New Zealand have one-year compliance periods, and California has three-year compliance periods. According to the TMG Bureau of the Environment, this longer compliance period is meant to allow companies to meet their caps through longer-term investments in energy conservation.
4. The **market price** for allowances in Tokyo has been extremely high. For example, in October 2014, the price of an excess credit was JP¥4,500 and RECs JP¥5,500.<sup>41</sup>
5. A facility's **Phase I target** is based on its industry.

### CHALLENGES

1. Efforts to implement a **national ETS in Japan were postponed** in December 2010, and, at present, there does not appear to be much momentum surrounding such a policy.

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