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**Cities and Climate Change Mitigation:  
Case Study on Tokyo's Emissions Trading System**

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## **Executive Summary**

The Tokyo Metropolitan Government has developed the world's first cap and trade program (called Emissions Trading System [ETS] in the Tokyo case) at the city level targeting energy-related CO<sub>2</sub>. The ETS covers around 1,340 large facilities including industrial factories, public facilities, educational facilities, etc. as well as, uniquely, commercial buildings and went into effect in April 2010. The City aims to reduce emissions by 25% from 2000 levels by 2020. CO<sub>2</sub> reductions are aimed at 6-8%<sup>1</sup> of 2000 levels in the first compliance period (2010-2014) with a possible further 17% reduction by the end of the second compliance period (2015-2019) in order to achieve this goal.

In addition to the status as the world's first city level ETS specifically for greenhouse gases (GHGs), the Tokyo case is particularly notable for the organized strategy that simultaneously gained wide stakeholder acceptance while setting stringent goals for GHG emitters in its jurisdiction. The strategy built an ETS framework that is sufficiently complex to tackle the practical problems in realizing GHG reductions while also reducing the burden on the participatory facilities as far as possible.

That said, the lessons from Tokyo are widely applicable. Indeed, Tokyo's experience reflected in the pages that follow may become a formative part of the current ongoing discussion at the national level in Japan. While some features and approaches contained herein may be particular to Tokyo, many aspects will serve other policy makers well. It is hoped that other city policy practitioners reading with a critical eye towards the applicability of Tokyo's experience in their own context may find the contents of this paper useful in their deliberations concerning the achievement of GHG reductions for clean development.

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<sup>1</sup> Depending on type of facility (see Section 2.3).

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## **1 Background**

### **1.1 Case Study Background**

As urban areas account for more than half of the world's population but almost 70% of the world's energy use, targeting the city level for the reduction of greenhouse gas (GHG) emissions is of vital importance to meeting goals for CO<sub>2</sub> reduction. Nevertheless, up until now, all city-based ETS systems have been largely aimed at enhancing air quality and the local environment through the targeting of local pollutants that also may happen to be GHGs. There has been no organized effort in the form of an ETS at a city level—until Tokyo—to reduce emissions of GHGs.

The Tokyo Metropolitan Government (TMG) has developed the world's first cap and trade program (called Emissions Trading System [ETS] in the Tokyo case) at the city level targeting energy-related CO<sub>2</sub>. The ETS covers around 1,340 large facilities including industrial factories, public facilities, educational facilities, etc. as well as, uniquely, commercial buildings and went into effect in April 2010. The City aims to reduce emissions by 25% from 2000 levels by 2020. CO<sub>2</sub> reductions are aimed at 6-8%<sup>2</sup> of 2000 levels in the first compliance period (2010-2014) with a possible further 17% reduction by the end of the second compliance period (2015-2019) in order to achieve this goal. This contrasts the National Plan<sup>3</sup> that targets a 25% reduction below 1990 levels by 2020 and a reduction of 80% below 1990 levels by 2050.

This short paper is meant to serve as a learning tool for city policy practitioners around the world considering policy interventions aiming to reduce GHGs. The information contained herein principally revolves around the processes used and the lessons learned during the development of the Tokyo ETS and thus will hopefully be useful for guiding the development of ETS systems around the world.

### **1.2 Overview of Emissions Trading Systems (ETS) already in Operation**

Although there are several ETSs targeting GHGs around the world, they are all functioning at an international, national, or sub-national level. None functions at a city level until Tokyo.<sup>4</sup> At the city level<sup>5</sup>, there are three particularly relevant cases of current ETSs covering local pollutants that are summarized below. The following Table 1-1 summarizes the ETSs currently in operation around the world at all levels of government.

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<sup>2</sup> Depending on type of facility (see Section 2.3).

<sup>3</sup> Basic Act on Global Warming Countermeasures.

<sup>4</sup> TMG also governs Tokyo prefecture.

<sup>5</sup> In addition, from the climate change planning documents of London, United Kingdom, Paris, France, and Austin, Texas, United States, there seem to be intentions to reduce GHGs through a carbon credit system, but it is not clear the exact form such a system would take.

**Table 1-1 Other ETSs in Operation**

<b>Governmental Unit</b>	<b>Name of ETS</b>	<b>Target Pollutant</b>	<b>GHG</b>	<b>Target Organization</b>
<b>International ETSs</b>				
European Union	EU-ETS	CO <sub>2</sub> , CH <sub>4</sub> (methane), N <sub>2</sub> O (Nitrous Oxide), HFCs (Hydrofluorocarbons), PFCs (Perfluorocarbons), SF <sub>6</sub> (Sulfur Hexafluoride)	Yes	Electricity generation and energy-intensive industries
<b>Country-Based ETSs</b>				
United Kingdom	CRC <sup>6</sup> Energy Efficiency Scheme	Energy-based CO <sub>2</sub>	Yes	Large organizations with high energy consumption (although exempts those covered by Climate Change Agreements or the EU-ETS)
<b>Sub-National ETSs</b>				
Northeastern and Mid-Atlantic United States	Regional Greenhouse Gas Initiative (RGGI)	Energy-based CO <sub>2</sub> from power plants	Yes	Electricity generators
New South Wales, Australia	Greenhouse Gas Reduction Scheme (GGAS)	GHGs from electricity production	Yes	Energy producers and highly energy-intensive users
<b>City-Based ETSs</b>				
Los Angeles, United States	Regional Clean Air Incentives Market (RECLAIM)	Nitrogen Oxides (NO <sub>x</sub> ), Sulfur Oxides (SO <sub>x</sub> )	No	Facilities emitting more than 4 tons a year of either gas.
Chicago, United States	Emissions Reduction Market System (ERMS)	Volatile Organic Materials (VOMs) (particularly tropospheric ozone)	No <sup>7</sup>	Stationary sources emitting more than 10/tons per season (2 seasons per year)
Santiago, Chile	Emission Offset Program of Supreme Decree No. 4	Total Suspended Particles (TSP)	No	Stationary combustion sources with a rated exhaust gas flow rate greater than 1,000 m <sup>3</sup> /hour

Source: Environment Canada (2010), Kamal-Chaoui, L. and Robert, A. (eds.) (2009), Illinois EPA (2010), Schreifels (2010), SCAQMD (2010), GGAS (2010), RGGI (2010), UK Department of Energy and Climate Change (2010), and EUR-Lex (2010)

### **1.3 General Background of Tokyo and TMG's Jurisdictional Boundaries**

Tokyo prefecture consists of 23 wards, 26 cities, 5 townships and 8 villages, and its administration is governed by the Tokyo Metropolitan Assembly as the decision-making body and Tokyo Metropolitan Government (TMG) as the executive body. The general accounting budget in 2008 was JPY 6,856 billion (about USD 75 billion). The metropolitan area often refers to the area that consists of 3 prefectures including Tokyo with a total population of 35 million, but there is no definitive authority for the entire area except a coordinating committee. TMG governs Tokyo Metropolis.

<sup>6</sup> CRC was formerly known as the Carbon Reduction Commitment but is now simply known as the CRC.

<sup>7</sup> While CC mitigation was not an objective of ERMS, tropospheric ozone is a GHG, so to a limited extent there are co-benefits from this ETS for climate change mitigation.

The Tokyo Metropolis population was 12.9 million people in 2008 and has increased annually by an average of 5.6% since 2001. It has area of 218,727ha with 35.9% forested. The population density for the inhabitable area was 9,009 persons per sq. km in 2005. The climate in Tokyo is categorized as humid subtropical, with average humidity levels around 60% with about 1,700mm precipitation annually. Its economy is dominated by tertiary industries, accounting for over 80% of the total number of business establishments, and the average income per person was about 4.8 million Japanese yen (52,500 USD) in 2005.

## **1.4 Governance and Operative Framework for TMG**

### **1.4.1 TMG Bureau of Environment (BOE) within the National Framework**

In 1998, following the adoption of the Kyoto Protocol, the national government of Japan enacted the “Law Concerning the Promotion of the Measures to Cope with Global Warming”<sup>8</sup>, Article 4 of which stipulates that local governments promote policies to limit GHGs as well as enhance carbon sinks. This law suggested every prefecture to set up a “Center for Climate Change Action” in order to enlighten citizens and promote activities contributing to anti-global warming measures although TMG already had a bureau responsible for this at the time of enactment.

At the 2002 ratification of the Kyoto Protocol, the government amended the Global Warming Law under Article 20 to make the responsibility of local governments more clear. Act 20 reads:

*In view of the Kyoto Protocol Target Achievement Plan, prefecture and municipal governments shall endeavor to formulate and to implement comprehensive, plan-based programs for the control of greenhouse gases, in accordance with the natural and social conditions of their local areas. (Sugiyama N. and Takeuchi, T., 2008)*

In 2008, the Target Achievement Plan was again completely revised per the former Prime Minister Yasuo Fukuda's target reduction levels of 60-80% from 2008 levels by 2050 and 14% reduction by 2020. The revised version focuses on supporting low-carbon levels in urban and regional areas through actions in: (i) implementing an ETS, (ii) consideration of taxes for GHG reduction, (iii) promoting renewable energy, (iv) lifestyle changes, (v) urban planning, (vi) energy-efficient industry, (vii) nuclear energy promotion, (viii) adaptation to climate change, and (ix) international cooperation.<sup>9</sup>

Regardless of the national goals and stipulations, the National Government takes a relatively hands-off approach and expects—instead of directs—the lower levels of government to work to achieve general targets towards emissions reductions (Sugiyama N. and Takeuchi, T., 2008). In addition, the exact targets for reductions are left up to the lower forms of government, although the national guidelines give suggestions about sectoral targets and the exact GHGs to cover. This means that the local targets are not directly connected to the national targets and there is significant heterogeneity in the actual sectors and GHGs targeted among the local governments.

Figure 1-1 depicts the relationship between the national government policies and the TMG ETS preparation.

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<sup>8</sup> *Chikyuu Ondanka Taisaku Suishin-hou*

<sup>9</sup> Bill of the Basic Act on Global Warming Countermeasures

Figure 1-1 History of National Policy and City Level Action

	National Level	TMG ETS Development
1990's	1990: Action Plan to Arrest Global Warming	
	1998: Adoption of Kyoto Protocol in Japan -Promotion of Nuclear Power -Energy Conservation Law -Law Concerning the Promotion of the Measures to Cope with Global Warming	
2000-2005	2002: Ratification of Kyoto Protocol and revision of Article 20 of Global Warming Law →decentralized climate change planning under "Target Achievement Plan"	2000: ordinance amendment for mandatory emissions reporting  <b>ETS Planning</b> -2002: Deliberations begin  -2005: Fail to gain stakeholder agreement on emissions cap  -2005: Enforcement of Kyoto Protocol →lower levels of government draw up plans  <b>2002-2004: Phase 1 of Voluntary Scheme</b> -Emissions reporting -Voluntary emissions reductions setting -3 year emissions reduction plan -March 2005: decide on evaluation and public announcement
	2005: Enforcement of Kyoto Protocol →lower levels of government draw up plans	
2005-2010	2008: Complete revision of Target Achievement Plan →focus on Kyoto Mechanisms (60-80% cuts in emissions from 2008 levels by 2050 and 14% by 2020)	<b>2005-2009: Phase 2 of Voluntary Scheme</b> -Public Announcements and evaluations of reduction plans begin  -Jun. 2007: Tokyo Climate Change Strategy -Jun. 2008: Ordinance Amendment for Cap & Trade implementation
	2009: Prime Minister Yukio Hatoyama announces cuts of 25% from 1990 levels	
		2010: April 1 <sup>st</sup> , start of ETS

### 1.4.2 The TMG BOE Approach

The Bureau of Environment of TMG, in coordination with other bureaus, is responsible for the planning and administration of environmental issues in Tokyo including development of climate change strategies, plans and programs as well as preparation of emission inventories.

The BOE is also the focal point for TMG's membership in the International Carbon Action Partnership (ICAP), which aims to increase the number of global cap and trade carbon markets in the world (TMG Website). Although the scheme as it currently stands does not currently allow for project-based international credits under the Kyoto Mechanisms and only limited trading outside of Tokyo Metropolis domestically, it might be possible in the future to integrate the Tokyo ETS with international emission trading abroad.

BOE also emphasizes a participatory approach in the planning and implementing stages, arguing that active participation of all the stakeholders in Tokyo is essential to address environmental problems. In the planning stages, BOE collected opinions of communities, industries, municipalities, NGOs, scholars, research institutes and energy suppliers through public opinion surveys, internet based monitoring questionnaires on BOE's administration, surveys of municipality and stakeholder meetings on an irregular basis, and reflected them into its strategies, plans and programs. In this, TMG used a two-pronged-approach: TMG simultaneously formed the outline of actions through an Environmental Advisory Committee while at the same time TMG consulted with other stakeholders to gather input and gain their acceptance. It was in these meetings that, TMG had to discriminate between what it can compromise on and what it definitely needs to defend strongly in its proposal (Sakamoto, 2009).

## **2 ETS Development**

The establishment of TMG's Cap and Trade took many years to accomplish. Although there are other voluntary ETSs in existence in the world, TMG emphasizes that their ETS encompasses a mandatory cap on emissions. Below, ETS refers to an ETS with a mandatory cap on emissions.

The idea originated with the staff of the planning division, Department of General Affairs within the BOE in 2002 (Sakamoto, 2009a). TMG first launched a project for "Creating an Emission Trading Market" in 2002. It started by discussing with stakeholders the possible emission trading designs. In a series of internet workshops held with emissions auditing corporations, private firms, and financial institutions, discussions covered (i) methods of calculating emissions, (ii) methods of categorizing emissions, and (iii) trading methodologies. At the same time, TMG set up an advisory board consisting of experts and researchers in this area and over time developed a proposal for an emission trading scheme.

Although the ETS was under consideration in the background, before the Metropolitan Assembly approved the ETS in 2008, the Bureau of Environment did not have sufficient legal power to oblige facilities to reduce emissions, and therefore the Bureau developed another voluntary reduction plan starting in 2002 (see details in Section 2.1.1). Through this program, the Bureau deployed its staff to help the facilities implement the voluntary plan. It was here that the BOE staff obtained information concerning private sector ways of thinking and decision making, institutional makeup, rules, and constraints. TMG also made use of the accumulated data and experiences to develop the ETS.

On an on and off basis, progress was made convincing stakeholders of the necessity of an ETS with a mandatory cap. In June 2007, the Tokyo Climate Change Strategy was implemented to pave the way for the ETS. After this, the Metropolitan Assembly passed an ordinance in 2008 that incorporated implementation of ETS into the "Tokyo Metropolitan Environmental Security Ordinance".

Following approval of the scheme, a considerable amount of work was required to prepare for the scheme's implementation. The Emission Reduction Section of the Urban and Global Environment Division is responsible for organizing the scheme and preparing guidance to the roughly 1,340 covered facilities.

### **2.1 Reasons for the Development of the ETS over Other Options**

#### **2.1.1 Previous Attempts at Controlling GHG Emissions under a Voluntary Scheme<sup>10</sup>**

Starting in 2000 TMG initiated the "Tokyo CO<sub>2</sub> Emission Reduction Program" under the "Tokyo Metropolitan Environmental Security Ordinance<sup>11</sup>". This voluntary program started in April 2002, and TMG initiated a voluntary scheme to implement emissions reductions and to set goals for emission reductions. In industry and commercial sectors, TMG prioritized reductions in CO<sub>2</sub> emissions from large-scale business facilities and buildings with greater than 1,500 kL of crude oil equivalent energy use per year, which represent less than 1% of businesses in Tokyo but emit about 40% of all CO<sub>2</sub> in this sector. One of these facilities emits the same GHG amounts as 3,300 households. (Miyazawa, 2010)

Under the first phase of Tokyo CO<sub>2</sub> Emission Reduction Program from 2002-2005, the facilities were required to (i) report emissions, (ii) set a target based on the average from the past consecutive three years' emissions, and (iii) then set up plans to implement the required basic reduction measures set by TMG and any additional voluntary measures. The first phase resulted in an average of about 2% emissions reductions.

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<sup>10</sup> Tokyo Metropolitan Government (2010)

<sup>11</sup> *Tomin no Kenkou to Anzen wo Kakuho suru Kankyou ni Kansuru Jourei*

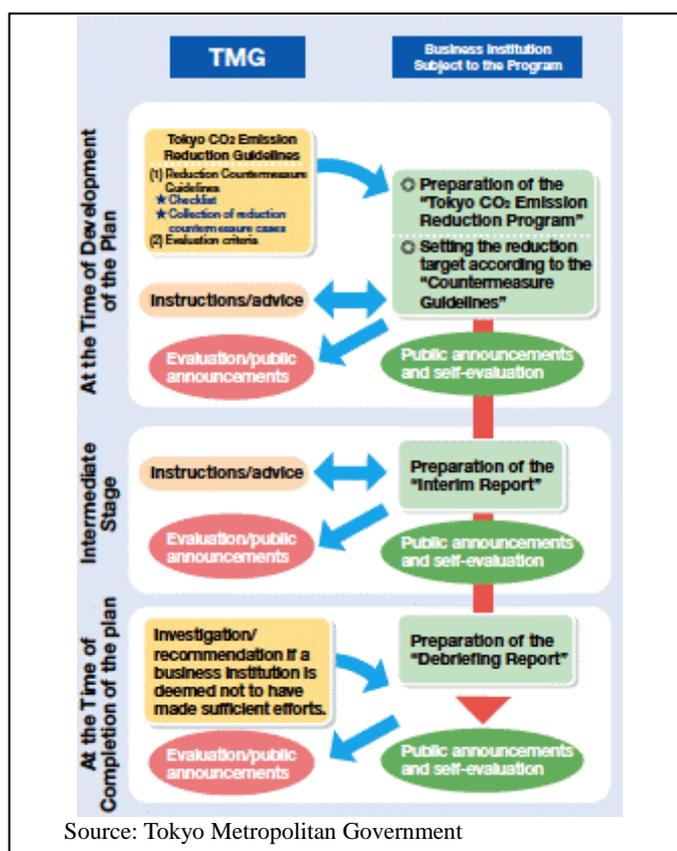
In 2005, TMG tried to implement an emissions cap but was unable to reach an agreement. However, in March 2005, the Environmental Security Ordinance was revised to launch the second phase of the Tokyo CO<sub>2</sub> Emission Reduction Program and an evaluation mechanism was put into place where a 5-scale rating was given to the facility plans. This included: AA (more than 5% reduction is planned through additional measures), A+ (more than 2% reduction is planned through additional measures), A (the basic measures are planned), B (only no-cost operational improvements are planned), C (no basic measures or no-cost operation improvement are planned). As shown in the figure on the right side in Figure 2-1, TMG provides instruction and advice at both the planning and implementation stages to help facilities set and achieve reasonable targets and assesses their achievement in the final year and publicize the results.

The average target levels remained around 3-4% on average for the participating facilities and about 25% of facilities achieved an AA level and an additional 75% achieved A or A+ ratings. The latter indicates that there is still much more room for reductions, and TMG ascribes the lack of actual reductions to the fact that the emissions reductions were not mandatory (Miyazawa, 2010).

### 2.1.2 ETS over Other Options

TMG adopted the ETS as a reasonable way to implement an economically efficient method for reducing emissions among the largest emitters in Tokyo. Although they considered other options such as a carbon tax, they thought that a carbon tax would be more appropriate for wide and shallow application among smaller facilities and residential areas where the marginal returns on managing and verifying emissions reductions falls as the number of facilities increases and the amount of emissions per facility decreases. That said, there are no current plans to implement a carbon tax among smaller business facilities or in the residential sector. (Miyazawa, 2010)

**Figure 2-1 Workflow of Tokyo CO<sub>2</sub> Voluntary Emission Reduction Program**



## 2.2 Enabling Conditions and Preparation Work in Tokyo

### Mandatory Reporting of Emissions Data from 2002-2009 (fiscal year basis)<sup>12</sup>

While the voluntary scheme was implemented, TMG was considering how an ETS might work.

As in the voluntary scheme, the initial target facilities—i.e. those using over 1,500 kL crude oil equivalent annually—were identified using surveys under the national Energy Efficiency Law for No.

<sup>12</sup> The Japanese fiscal year lasts from April 1<sup>st</sup> to March 31<sup>st</sup>.

2 Type Specified Energy Conservation Facilities<sup>13</sup> and additional inquiries carried out independently by TMG (Miyazawa, 2010).

The strategy included the mandatory completion of a five-year GHG emissions reduction strategy (ERS) and reporting of emissions on a yearly basis. Under the ERS obligation, large emitters submitted a five-year plan for GHG reduction and each facility's ERS was published publicly in order to provide incentives to perform an in-depth analysis of their emissions profile.

In the second part of the strategy, TMG obliged each facility to perform emissions inventories. This data was collected at the BOE. TMG followed up with non-reporting facilities on a continuous basis. (Tokyo Metropolitan Government, 2010 and Miyazawa, 2010)

Although this program existed partly for background planning data collection for the eventual implementation of the ETS, TMG also aimed to help facilities to analyze closely the breakdown of their energy consumption in order to identify areas that they could target for energy efficiency. While it is true that TMG obtained baseline data and a database of the kinds of machinery and equipment installed at each facility, it is also notable that each individual facility gained information about the GHG profile of individual equipment and therefore confidence in their ability to achieve emissions reductions once caps were enforced (Suzuki, 2010).

#### Initial Planning

From 2002, in the background of the voluntary efforts and the mandatory reporting scheme under the Tokyo CO<sub>2</sub> Emission Reduction Program, TMG planned the implementation of a cap and trade-type system. The initial catalyst for this came as BOE realized its existing emission reduction support measures for large businesses were not sufficient to achieve BOE's overall mitigation target, a 25% reduction from 2000 levels by 2020.

#### Importance of Stakeholder Consultations for ETS Formulation

During the preparatory period, in December 2006, TMG formulated their "10-year Project for a Carbon-Minus Tokyo" plan. This was a plan for the entire TMG organization (including welfare, rail, etc.) and the ETS was developed as the mechanism for the reduction of emissions from large businesses who previously had achieved only mediocre results under the voluntary reduction schemes. This was also the document under which TMG put into place the emissions reductions goals of 25% reduction from 2000 levels by 2020.

Stakeholders include business lobbies, educational facilities, public facilities, and building owners. Although the ETS was under consideration from 2002, starting in 2007 many objections were raised by these groups (such as the *Keidanren*, Japan's largest business lobby) as the discussions became more focused as the TMG put into place the Tokyo Climate Change Strategy in June of that year. The stakeholders complained that the ETS has the potential to restrict economic activities in Tokyo, and some facilities considered caps to be excessive without recognizing past efforts under the voluntary scheme.

From July 2007 to January 2008, three stakeholder meetings were held to introduce TMG's plans for climate change strategy, introduce the current status of global warming and its effects on Tokyo, and gather stakeholder opinions about the role of TMG in climate change mitigation, including the ETS. These stakeholder meetings were instrumental in developing an ETS scheme that was both technically sound and implementable by the facilities through the exposure of technical issues peculiar to each facility's actual operations. In doing so, TMG garnered support for the ETS while also developing flexible mechanisms for general application.

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<sup>13</sup> *Shouenehou no dainishu enerugii shitei kanrikoujou*

In discussions concerning the actual amount of the carbon cap, debate revolved around whether to make the cap mandatory or voluntary. Stakeholders considered general carbon caps difficult and unfair because possible reduction amounts vary among business establishments. Through continuous discussions, TMG addressed these issues by asking for and obtaining cooperation from private facilities. In the end, the BOE-supported general cap on emissions was chosen.

### Legislative Provisions

After many years developing a database and receiving stakeholder comments under the voluntary system and under the Tokyo CO<sub>2</sub> Emission Reduction Program, in 2008 BOE finally received Tokyo Metropolitan Assembly approval for the implementation of the ETS. This amendment formed the legal basis for implementation of the ETS and was instrumental in finally overcoming previous criticism of the ETS by trade groups. After this amendment, ETS implementation became a regulatory design issue and stakeholders took a more cooperative role in developing the details of ETS implementation.

The ETS is implemented under the “Ordinance on Ensuring Public Health and Safety in the Environment”, which was amended by the Tokyo Metropolitan Assembly in July of 2008 to include clauses for the establishment of emissions caps on large emitters beginning on the 1<sup>st</sup> of April 2010.

## **2.3 Details of ETS Development**

In April 2010, the ETS was launched with the participation of around 1,340 facilities.

### Targeted GHGs<sup>14</sup>

Although companies are encouraged to report on their total GHG consumption profile, energy-based CO<sub>2</sub> is the only gas traded on the ETS. The use of a single gas was partly for simplification reasons and to lessen the risk of failure for an ETS that has not been tried before. However the specific reasons for singling out CO<sub>2</sub> are fourfold.

Firstly, TMG aimed for simple measurement in energy-based CO<sub>2</sub> emissions management. Tokyo's emissions are dominated by commercial buildings, which in turn have an energy consumption profile made up almost exclusively of distributed electricity. The vast majority of emissions is therefore easy to report and audit.

Second, from a precision standpoint, since electricity meters are installed in all commercial, residential and industrial buildings on a subdivided basis, it provides a very simple, precise, and segmented method to calculate total emissions by multiplying the monthly electricity consumption on the bill received by a crude oil CO<sub>2</sub> emissions factor to arrive at a final number for reporting. The same precision is gained in using fuel bills for other energy-based CO<sub>2</sub> emissions (see Appendix 1).

Thirdly, related to the second point, many companies do not employ specialists in emissions monitoring, so the simple multiplication of the consumption figures inscribed on the electricity bill or fuel bill by a CO<sub>2</sub> emissions factor is less burdensome to the company from a technical standpoint. For companies that may use other fuels for their operations, TMG aimed to make it simple to calculate through simply adding how much of each fuel was used. Although some companies and factories may emit gases other than CO<sub>2</sub>, TMG seems to have compromised on this point in order to gain stakeholder acceptance.

Fourthly, since the ETS is at its heart a market system, it relies on confidence among market

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<sup>14</sup> The checklist used by institutions in calculating energy-based CO<sub>2</sub> is provided in Appendix 1 of this document.

participants in the value of the good traded. Since for technical reasons CO<sub>2</sub> emissions are relatively simpler to understand and audit, companies trading credits in the ETS can have confidence that the CO<sub>2</sub> reductions being traded was measured and certified correctly.

Fifthly, 95% of Tokyo's emissions are CO<sub>2</sub> energy based emissions.

### Target Facilities

At present, 1,340 facilities fall under the ETS provisions. Under the Tokyo Metropolitan Environmental Security Ordinance, TMG segments facility types into large-scale facilities and small and medium sized facilities (SMF). The mandatory cap is only applicable to the large-scale facilities. The SMFs are handled under a different scheme. These difference is summarized below.

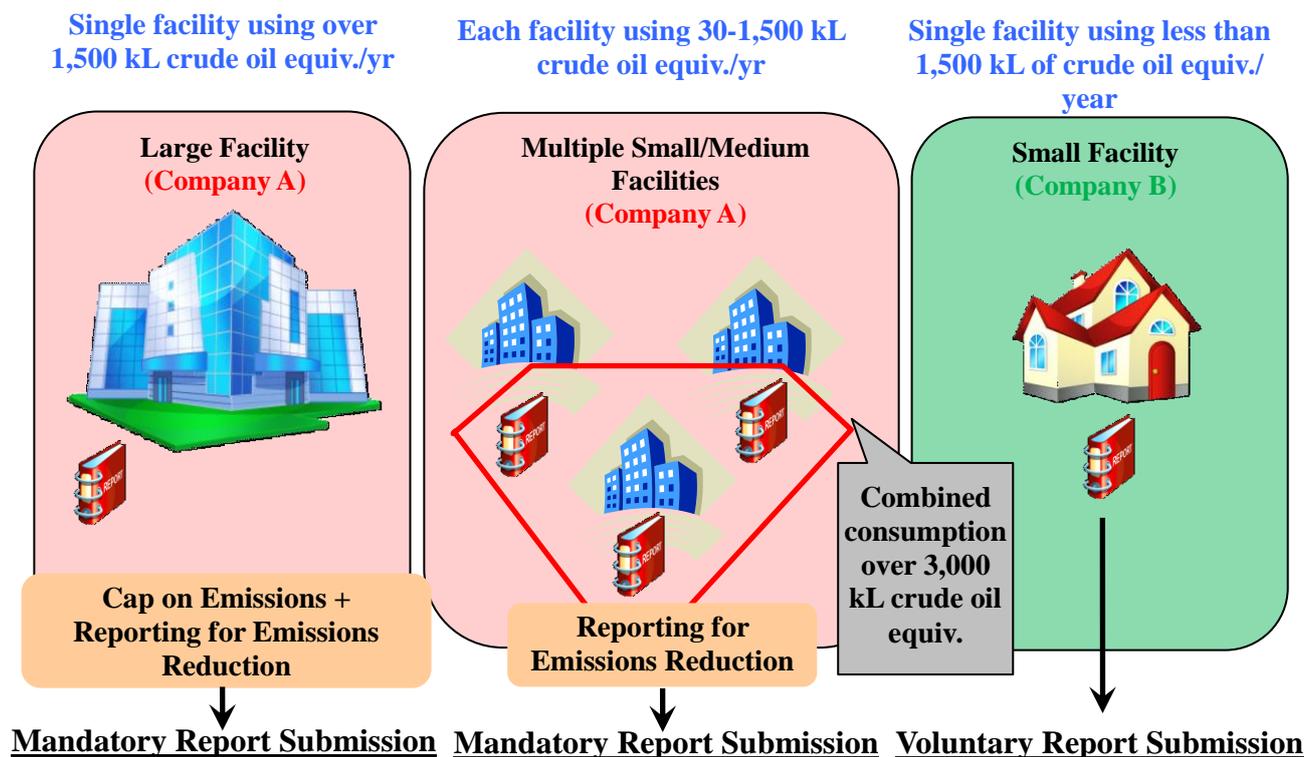
- (i) **Large Scale:** For one building or facility that consumes more than 1,500 kL crude oil equivalent a cap is set and the building must reduce emissions and also make a reduction plan. For tenants in buildings that rent/lease more than 5,000 sq. m. of space or consume more than 6 million kWh per year, they must create their own emissions reduction plan submitted through the building owner, although each tenant is not specifically required to cap their emissions. If no individual tenant exceeds these energy consumption limits but a single building as a whole does, the tenants are required by law to cooperate with the building owner in reporting of emissions although the final report is submitted by the building owner. The calculation methodology for emissions are made publicly available using an excel worksheet from the TMG BOE website<sup>15</sup> (see Appendix 1 of this document). These emissions must be verified by a third party auditor.
- (ii) **SMFs:** The second segment targets SMFs that may have a number of buildings, factories, etc. spread out over a wide area in Tokyo. If the combined crude oil equivalent consumption per annum is over 3,000 kL per annum but no single building or facility is over 1,500 kL per annum, the headquarters of the company must submit an energy efficiency plan report every year. This report is publicly published. Although these SMF companies are not required to cap their emissions, the city aims to (i) help the company understand their energy consumption profile and (ii) understand methods to lower emissions. If the consumption of an entire company is less than 3,000 kL per annum and no one facility consumes more than 1,500 kL per annum there is no obligation to submit a report for their facility, but the city welcomes such micro facilities with interest in lowering emissions to submit plans for energy efficiency on a voluntary basis under this second segment or larger companies that have such micro facilities to include the facility in their report.

For large companies that, for instance, have one factory that falls under the first segment, the factory is treated separately from the company for the purposes of CO<sub>2</sub> reduction obligations although the company as an entity includes the factory under its emissions reductions plan. Buildings of such a company that use less than 30 kL per year are excluded from the calculation but the company is welcome to submit a report on such small scale facilities voluntarily. For illustrative purposes, an example of the interaction between the two reporting segments is pictorially described in Figure 2-2 below.

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<sup>15</sup> Download original worksheet (in Japanese) at:  
[http://www2.kankyo.metro.tokyo.jp/ondanka/data/energy\\_check.xls](http://www2.kankyo.metro.tokyo.jp/ondanka/data/energy_check.xls)

Figure 2-2 Interaction between Large-Scale Segment and SMF Segment



Source: Adapted from Tokyo Metropolitan Government (2010)

Note: One company may have multiple obligations since the emissions measurements are made on a facility basis.

### Setting Reduction Targets<sup>16</sup>

For the first segment concerning large facilities, the emissions data gathered from 2002-2007 is used as a baseline for the emissions reductions. The average of any three consecutive years within that period is used as the baseline, and the facilities are free to pick which years to use although if there was some problem with the data (such as shutting down a factory for one year that significantly altered emissions), the facility can use two years only.

The emissions reductions targets were set at three different categories for the first compliance period (2010-2015):

- (i) **Category 1-A:** 8% for office buildings, public facilities, commercial buildings, lodging, educational facilities, medical facilities, etc. that do not fall under Category 1-B;
- (ii) **Category 1-B:** 6% for buildings in which air conditioning/heating from district cooling/heating plants make up more than 20% of energy consumption; and
- (iii) **Category 2:** 6% for factories that do not apply to Category 1.

Fines are imposed on those failing to reach their targets and failing to buy credits on the ETS. The fines amount to JPY 500,000 (about USD 5,500) plus an additional obligation in addition to the shortage. The names of offenders are also published publicly in a “name and shame” scheme to further incentivize reductions.

Large-scale business facilities and buildings are obliged to reduce their annual CO<sub>2</sub> emissions through energy saving equipment, machines, etc. but are also allowed to achieve their targets by buying

<sup>16</sup> Tokyo Metropolitan Government (2010)

emissions quotas from other entities that exceed their targets from the second year of the implementation of the program—i.e. after April 2011.

Facilities are required to report yearly in the form of the “Addressing Global Warming Planning Document”, a detailed excel document listing all equipment that an organization might have and the breakdown of emissions for the organization is part of this report. The document is used for ETS compliance purposes and the total progress towards each company’s goal is therein identified through measurement of total CO<sub>2</sub> output. The final emissions calculations from all machinery are summarized in a general calculation checklist called the “General Checklist for Emissions Monitoring for Facilities in the ETS” presented in Appendix 1 of this document.

#### Calculation of Allowances<sup>17</sup>

Allowances are grandfathered<sup>18</sup> in based on historical emissions and are calculated by compliance period. The total emissions allowance allowed under the compliance period is calculated as:

$$\text{Base Year Emissions} \times (1 - \text{Compliance Factor (6 or 8\%)} \times \text{Compliance Period (5 years)})$$

This means that for a hypothetical company with baseline emissions of 10,000 tons of carbon per year, 46,000 tons would be allowed over the first 5 year compliance period or 9,200 tons per year, which is a gross required reduction of 4,000 tons over 5 years or 800 tons per year according to the following equation.

$$10,000_{\text{yearly emissions}} \times (1 - 8\%_{\text{(company in Cat 1-A)}}) \times 5_{\text{years}} = 9,200_{\text{tons/year}}$$

It is also noted that particularly “top level” facilities may have their compliance factor lessened by 1/2 and “quasi-top level” facilities may have their compliance factor reduced to 3/4 of the original compliance factor. This factor is implemented from the following year for a three year period and the performance of the facility is checked on a regular basis.<sup>19</sup> There is rubric for grading the performance of each facility in energy efficiency and that rubric is judged based on the company reporting by the BOE on general administrative items, items related to building and facility performance, and items related to the operation of offices and facilities.

#### Emissions Auditing<sup>20</sup>

The auditing and verification of emissions is required by Tokyo under the ETS and the cost of auditing is borne by the facility under the ETS. Verification is carried out on a segmented basis. As of the time of writing, there are several dozen different private auditing companies within Tokyo that are licensed to verify emissions reductions although other auditing firms may register with TMG. Each auditing firm is registered to verify different segments. The different verification segments and the verification contents are summarized in Table 2-1 below.

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<sup>17</sup> Tokyo Metropolitan Government (2009)

<sup>18</sup> There is currently consideration of a gradual transition to auctioning of allowances, but this is still at an inchoate stage (Tokyo Metropolitan Government 2010a).

<sup>19</sup> See also (in Japanese):

[http://www2.kankyo.metro.tokyo.jp/sgw/daikibo/data090629/shiryu2\\_3\(16\)\\_090629.pdf](http://www2.kankyo.metro.tokyo.jp/sgw/daikibo/data090629/shiryu2_3(16)_090629.pdf)

<sup>20</sup> Tokyo Metropolitan Government (2009)

**Table 2-1 Verification Segmentation and Contents**

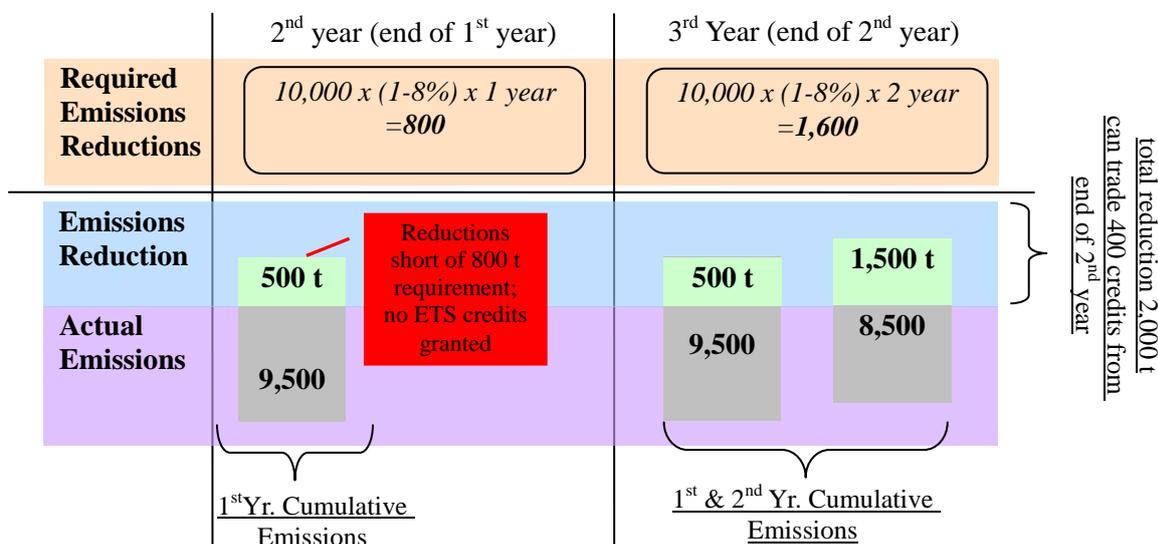
Verification Segments	Verification Contents
GHGs/ Baseline Amounts	<ul style="list-style-type: none"> <li>Annual GHG emission verification</li> <li>Verification of baseline for achievement of emissions reductions goals</li> </ul>
Emissions reductions inside and outside the city	<ul style="list-style-type: none"> <li>Small and medium sized facility (SMF) credit verification inside the city</li> <li>Credit verification outside the city</li> </ul>
Other gas emissions reductions verification	<ul style="list-style-type: none"> <li>Will be verified if other gases are included</li> </ul>
Verification of environmental value retention through electricity consumption changes	<ul style="list-style-type: none"> <li>Renewable energy verification, etc.</li> </ul>
Category 1-A facilities	<ul style="list-style-type: none"> <li>Certification of baselines and emissions</li> </ul>
Category 2-B facilities	<ul style="list-style-type: none"> <li>Certification of baselines and emissions</li> </ul>

Source: Tokyo Metropolitan Government (2010)

Arrangements for Trading and Offsets

The ETS commenced April 2010 and allows large businesses and buildings to trade CO<sub>2</sub> reductions in order to meet mandatory targets set under the law. If a facility exceeds its requirements under the cap, it is allowed to sell the remainder of the total accumulated emissions savings minus its obligations. Banking of any accumulated credits is allowed, but no borrowing is allowed under the ETS. This is illustrated in the following Figure 2-3 based on the assumptions provided in the previous allowance calculation.<sup>21</sup>

**Figure 2-3 Calculating Reductions Exceeding Obligations**



Source: Adapted from Tokyo Metropolitan Government (2009)

There are two ways for facilities to meet their emissions caps under the ETS. The first is independent emissions reduction through employing more energy-efficient equipment, machinery, buildings, etc. and the second is by trading through the ETS.<sup>22</sup> Details of both are given below:

<sup>21</sup> Ibid.

<sup>22</sup> City documents note that should the price of one ton of carbon spike, the city will take measures in order to reduce the price such as allowing the purchase of carbon through the Kyoto Mechanisms and expanding beyond the Tokyo area into other regional areas. For obvious reasons, the city does not want to share what the ceiling price may be.

- 1) Independent emissions reductions
  - Energy-efficient infrastructure, building materials, architecture, machinery, etc.
- 2) Traded credits for emissions reductions (ETS) (in principle, TMG asks that companies trade credits with each other rather than using the other three methods)
  - **Excess emissions reductions trading between companies:** buying emissions credits from facilities that have excess emissions credits.
  - **SMF credits:** buying emissions credits from SMEs that have implemented energy-saving measures reducing their own emissions voluntarily.
  - **Credits from outside the city:** buying emissions credits from facilities from own facilities outside the city (with restriction of up to 1/3 of base year credits)
  - **Renewable energy credits:** environmental value (Green Electricity Certification, and the City Solar Energy Bank).
    - **Green Electricity Certification:** can obtain certificates for emissions reduction (i) if the facility changes power sources and uses certified green electricity (certification carried out by TMG) or (ii) if the power company serving the target facility either installs increased renewable energy as a percentage of delivered end-user power or installs additional substations that bring in additional renewable energy from outside the Tokyo area.
    - **City Solar Energy Bank:** Run by “Cool-Net Tokyo”, this is a bank for residential renewable energy facility credits. When the city gives out subsidies for the facility of renewable energy in residences (solar power, solar water heating, etc.), the user—i.e. the household purchasing renewable energy—is required to relinquish 10 years worth of carbon credits to the City. These credits are then bought by businesses and individuals on a voluntary basis to offset their carbon footprint. (Tokyo Metropolitan Government, 2008).

#### Management of the ETS and Technical Provisions for Trading

The ETS is managed by the Emissions Cap and Trade Section of the Urban and Global Environment Division of the Bureau of Environment at TMG. Companies are required to report to this section on a yearly basis and all relevant information and ETS management is carried out through this section.

Starting in April 2011, one year after the start of obligatory emissions reductions, TMG will begin offering a platform on which companies can trade emissions reductions credits. In principle, the trading platform will consist of a matching system where companies can post excess credits on a message board system and contact each other through the website for the purchase of credits. Each posting consists of contact information (through a website form), amount of credits, and the company's name. The potential buyer will contact a number of sellers posting on the website and inquire as to the asking rate for the sellers' credits. If the buyer finds an appropriate seller or sellers, the transaction is registered in the website and the credits are deducted from the seller's account and credited to the buyer's account. However, actual cash transfer is handled directly between the two transaction parties, so no money goes through TMG.

Although companies may use the TMG trading platform for free, in order to make the price of credits more transparent, a wholly private joint venture between CoalinQ.com and Smart Energy to broker carbon credit trades. The joint venture will take a 5% fee of the sale of credits.

### **3 Plans for the Future**

#### **3.1 Expansion of GHG Coverage<sup>23</sup>**

There are no current plans for expansion of GHG coverage although facilities are allowed to voluntarily submit alternative GHG reduction schemes if they wish. As noted in Section 2.3, given the lack of knowledge at most companies regarding GHG emissions calculations, it is very difficult to calculate GHGs other than CO<sub>2</sub> at this time, and TMG does not wish to burden companies further at this time.

#### **3.2 Expansion of Geographic Coverage<sup>24</sup>**

There are no current plans to expand the applicability of the ETS beyond the administrative limits of Tokyo through domestic or international institutions. However, there have been recent moves by nearby Saitama Prefecture to implement a similar system, and Tokyo will cooperate the extent possible in Saitama's efforts. That said, TMG aims to be the world leader in low-carbon cities through the implementation of the ETS not only in the sense of achieving significant reductions in GHGs but also in that it wishes to share its experiences throughout the world through international cooperation with city coordinating bodies dealing with climate change such as ICAP, C40, R20 and international institutions such as the World Bank and UNDP. TMG is extremely positive about future cooperation with any facility that is interested to hear about their experiences.

#### Assistance to Development of National Plan

As of this writing, there are ongoing discussions in the National Diet concerning the adoption of an ETS system at the national level. A number of policy makers from different institutions in the government (such as the Ministry of Environment, prefectural governments, and TMG) are currently providing input to the final structure of Japan's emissions reduction scheme. In the expert committee formed for the purpose of discussing the proposal TMG has presented one possible framework closely modeled after its own experience.

As TMG found that stakeholder consultation was a particularly vital aspect of their own implementation, TMG is of the opinion that the national process could benefit greatly with further stakeholder involvement along the lines that TMG implemented in its preparatory stages. In addition, in order to make the proposal congruent with other trading schemes, TMG's proposal also includes ETS design aspects that will include credit verification closely designed along the lines of other national and international ETSs operating around the world.

As a matter of ETS efficacy, TMG strongly supports an absolute cap on emissions. However, industry stakeholders (such as steel makers and power plants) strongly support an efficiency-based target. In interviews with the TMG Emissions Cap and Trade Section, currently this point seems to be a very contentious issue in the National ETS discussions.

According to TMG, from a governance point of view, the target for a national system should be only very large facilities while cities and prefectures take responsibility for smaller facilities. TMG believes that the National Government could not monitor every business in Japan and there would be many good practices missed in reporting as well as a greater chance for unscrupulous companies to misreport their emissions, the very foundation of confidence in the ETS. TMG wants to assure that the National Government can take full advantage of the lessons—such as reading facility reports—that were so vital to the development of the Tokyo ETS.

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<sup>23</sup> This section is taken from Suzuki (2010).

<sup>24</sup> Ibid.

In any case, at the moment strong industry forces such as the *Keidanren* are lobbying against a national ETS, so it is unclear that the national ETS has the political support to carry through with implementation.

TMG submitted a document to the Ministry of Environment and Ministry of Economy Trade and Industry. A summary of TMG's recommended relationship between the national and prefecture governments is shown in Table 3-1 below.

**Table 3-1 Potential National Cap and Trade Program in Japan: TMG's Proposal**

	Item	National ETS	Regional/City ETS
1	Compliance Period	5 years	
2	Cap Setting	Based on GHG reduction target: 25% reduction below 1990 levels by 2020	
3	Target GHG	Energy-related CO <sub>2</sub> (with others added after established)	
4	Banking and Borrowing	Banking: allowed Borrowing: not allowed	
5	Penalties	Fines and penalties should be levied against those companies under the ETS that do not reach their emissions reduction targets and also do not buy credits on the ETS.	
6	Monitoring, Reporting and Verification	Shall be established under the national government with a common structure for national and sub-national governments	
7	Registry	National government shall establish and manage a registry to be used by both programs	
8	Facilities subject to program	Super large-scale facilities emitting over 100,000t CO <sub>2</sub> per year (energy and resource suppliers like power plants and steel plants)	Large-scale facilities that consume at least 1,500 kL (crude oil equivalent per year) including factories, office buildings and public facilities.
10	Coverage <sup>25</sup>	About 500 facilities (about 50% of total domestic CO <sub>2</sub> emissions)	About 14,000 facilities (more than 60% of domestic CO <sub>2</sub> emissions)
11	Allowance allocation	Auctioning considered (except for perhaps some energy-intensive industries)	Grandfathering with a potential transition to auctioning
12	Offset credits	- Kyoto credit fungible under certain conditions - Domestic renewable energy certificates fungible	- SMF facility credits fungible - Domestic renewable energy certificates fungible
13	Program Administration	National Government	Prefectures and major cities

Source: Tokyo Metropolitan Government (2010a)

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<sup>25</sup> Some overlap of coverage would occur. It is not clear how this would be addressed.

## 4 Key Lessons Learned

TMG benefited from a generally cooperative environment as a city with a very high level of technical and financial management capacity not only in the government but in much of the private sector that drives the city's economy. However, TMG, utilizing their practice of continuous learning, was able to successfully drive the implementation of an ETS through (i) development of mandatory reporting, (ii) experience in incentive-based voluntary scheme, (iii) political support from Governor of Tokyo in making emissions reductions legally binding, (iv) interaction with all stakeholders, (v) appropriate timing for each step of implementation, (vi) development of a reporting system that is unburdensome to target facilities, (vii) appropriate design of the ETS, and (viii) third party auditing of emissions.

**Mandatory Reporting:** The first important measure was to establish the Tokyo CO<sub>2</sub> Emission Reduction Program under the Tokyo Metropolitan Environmental Security Ordinance for the largest emitters in the city. In this way, the facilities under the scheme were able to see on paper key areas where they could find opportunities for energy efficiency improvement. In addition, these reports gave TMG a large database of information concerning not only the overall GHG emissions of a company, but since the overall GHG emission calculation is based upon a very detailed breakdown of each individual energy consuming source, the reports showed the exact machinery/infrastructure/etc. in place at each facility and listed data on best practices for energy efficiency on a segmented basis. This also had a positive effect in stakeholder consultations as TMG was able to respond to recalcitrant stakeholders who thought it difficult to achieve energy efficiency targets—in effect, the mandatory reporting gave the city a data-based argument to assert that energy efficiency targets were possible. Mandatory reporting was therefore an essential confidence-building measure while simultaneously serving as a data acquisition tool.

**Incentive Development:** While the Tokyo CO<sub>2</sub> voluntary emission reduction program showed only minimal success in achieving emissions reductions, the program also afforded TMG the opportunity to learn about creating incentives for the facilities under its purview. In this background of initially disappointing results for emissions targets, TMG undertook measures to strengthen the program by: introducing guidelines for target setting and reduction measures, evaluation and public announcement of results of mitigation efforts, and submission of progress reports. These supplementary incentive mechanisms successfully contributed to a more serious commitment for this program and the average target level among the 1,255 facilities participating rose to 4.8%. Additionally, 98.5% of facilities received a rating of A, A+ or AA (although only 25% of facilities achieved AA); that is, almost all facilities completed planning of basic measures requested by TMG even if actual emissions reductions remained around 3-4% on average. In this regard, incentives are especially necessary for voluntary programs and at least proved to be semi-effective, even if not enough to achieve the city's emission reduction goals. In a sense, the development of the ETS was partly an extension of these incentives under a mandatory regime.

**Legal Framework:** Although incentives are important, the lessons from Tokyo indicate that it is difficult to achieve ambitious reduction targets only with voluntary efforts. Voluntary efforts should be thought of as a proof-of-concept to gain support within the government apparatus and among stakeholders for binding measures. Strong top-down leadership is essential and was provided by the Governor of Tokyo, Shintaro Ishihara. Legally binding and enforceable measures strengthen the process for planning effective actions. From this perspective it is considered very important to institutionalize relevant instruments through legal mandate.

**Stakeholder Interaction:** Interacting with stakeholders was repeatedly identified as the most important lesson learned in Tokyo. Including stakeholders from the beginning afforded TMG the chance to at once tailor the ETS to the actual everyday workings of each individual company while simultaneously developing a program responsive to the ambitious reduction goals set forth by TMG. Of course the stakeholder meetings identified areas for improvement for a number of technical details for ETS design (see Appendix 2), but, more importantly, the stakeholder meetings also helped TMG to

build confidence among the ETS participants and respond to criticisms of the plans through data gleaned in mandatory reporting.

**Appropriate Implementation Timing:** The timing for each step in development of the ETS helped to gain support for the ETS in the government and in the private sector. Using some of the lessons gained in the voluntary scheme, TMG simultaneously considered the ETS in the background. The implementation of Tokyo's Climate Change Action Strategy following the TMG 10-Year Plan gave a springboard for ETS implementation under a cap and trade regime. At the same time, stakeholders from the potential facilities were invited to participate in the development of the details of the ETS in late 2007 and early 2008 as well as in the Environmental Advisory Committees since 2002. In mid-2008, the proposal was submitted to the Tokyo Metropolitan Assembly, who, in evaluation of the voluntary incentive schemes combined with the support gained in the stakeholder consultations, approved the implementation of a mandatory emissions reduction scheme with an ETS.

**Simple Reporting System:** Many companies had complained that they do not have the technical capacity to develop an emissions report each year. The development of a simple reporting system that relied on existing data from electricity, gas, and fuel bills and equipment inventory lists was one of the most important elements for gaining acceptance for the ETS while also obtaining reliable data. That said, reporting in such a way limits the target gases to energy-based CO<sub>2</sub>. In the case of Tokyo, this was considered appropriate, since the dominant emitter of GHGs is the commercial building sector.

**Appropriate ETS Design:** Designing an ETS appropriate to the conditions in a city and responsive to the goal of the BOE—i.e. the reduction of the gross total (not the per capita amount) of GHGs from the City—was essential for effective reductions of emissions. While the exact details of the ETS may be specific to Tokyo, there are several lessons with wide applicability for effective emissions reduction. The first is establishing an absolute cap on the emissions of each individual facility instead of an intensity-based cap. An intensity-based cap can lead to energy efficiency, which is necessary but not sufficient to achieve reduced emissions, but the goal of TMG is a general reduction in the total amount of GHGs from a city. Given the structure of TMG's emissions portfolio, an absolute cap was considered the only way to reach this goal. Secondly, the TMG initially focused on those facilities under its jurisdictional purview that will have the greatest impact on total emissions. By doing so, the city will avoid the mire of managing several tens of thousands of facilities that only have a marginal effect on emissions reductions and target those facilities that have the largest potential impact.

**Third Party Auditing:** TMG considers that third-party auditing of emissions is a very essential point in development of their ETS. In requiring auditing, TMG assures that the facilities are reporting correctly, and market participants are ensured that the credits they are buying are accurately calculated.

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**Appendix 1: General Checklist for Emissions Monitoring for Facilities in the ETS**

**■ Checklist for Facilities under the “General Emissions Cap under the ETS”**

▼ Fuel and heating, input column for yearly energy use

Fuel Type		Yearly Use		(2) Crude Oil Conversion Factor [kL]	Ref. (calculation values)		
		Unit	(1) Value		(3) Heat Generation per unit used [GJ/Unit]	(4) Crude oil equiv. heat generation [kL/GJ]	
Fuel Type	Crude Oil	kL			38.2	0.0258	
	Amount of gas-condensate (NGL)	kL			35.3		
	Gasoline (Benzine)	kL			34.6		
	Naphtha	kL			33.6		
	<b>Heating Oil</b>	kL			36.7		
	<b>Gas Oil</b>	kL			37.7		
	<b>A Heavy Fuel Oil</b>	kL			39.1		
	B/C Heavy Fuel Oil	kL			41.9		
	Asphalt Petroleum	t			40.9		
	Petroleum Coke	t			29.9		
	Petroleum Gas	LPG	t				50.8
		Petro-hydrocarbon gas	Thousand Nm <sup>3</sup>				44.9
	Combustible Natural Gas	LNG	t				54.6
		Other combustible gases	Thousand Nm <sup>3</sup>				43.5
	Coal	Raw coal	t				29.0
		General coal	t				25.7
		Anthracite coal	t				26.9
	Coking coal	t			29.4		
	Coal tar	t			37.3		
	Coke-oven gas	Thousand Nm <sup>3</sup>			21.1		
Blast furnace gas	Thousand Nm <sup>3</sup>			3.4			
Converter gas	Thousand Nm <sup>3</sup>			8.4			
<b>Other fuels</b>	<b>City gas (13A)※1</b>	Thousand Nm <sup>3</sup>			45		
	<b>City gas ( )</b>	Thousand					

			Nm <sup>3</sup>			
		<b>Steam (commercial)</b>	GJ			1.02
		<b>Steam (non-commercial)</b>	GJ			1.36
		<b>Hot water</b>	GJ			1.36
		<b>Cold water</b>	GJ			1.36
		( )				
<b>Electricity</b>	<b>General Power Supply ※2</b>	<b>Daytime (8:00-22:00)</b>	Thousand kWh			9.97
		<b>Nighttime (22:00-8:00)</b>	Thousand kWh			9.28
	<b>Others</b>	<b>Other purchased electricity</b>	Thousand kWh			9.76
		<b>Private generation</b>	Thousand kWh			
<b>Crude Oil Used (Conversion Total)</b>			<b>kL</b>			

▼ Facility confirmation

Please input all fuel, heat, and electricity use

If the total crude oil used after conversion is greater than 1,500 kL, the facility is subject to mandatory emissions reductions.

(Notes)

※1 For city gas, if the facility is receiving other gas besides (13A), then the facility should inquire to the gas company about the unit heat generation factor or else fill out column (3) Heat Generation per unit used 【GJ/Unit】 per the GHG emission calculation guidelines

※2 For electricity coming from general power suppliers (in Tokyo, Tokyo Electric Power Company), if the split between daytime and nighttime electricity consumption is not clear, please mark all in the “others” row.

※3 Since fuel oil for private electricity generation is already calculated in other rows, the columns for private electricity generation are marked through.

※4 Please refer to the GHG emission calculation guidelines to determine the extent of the applicability of this checklist to each facility in an facility

Source: Translated from [http://www2.kankyo.metro.tokyo.jp/ondanka/data/energy\\_check.xls](http://www2.kankyo.metro.tokyo.jp/ondanka/data/energy_check.xls)

## **Appendix 2: Stakeholder Suggestions**

Although there were many different lessons learned in the detailed record of the three stakeholder consultations, some of the examples that best show how stakeholder discussion unveiled relevant and unforeseeable details included:

### **Comments on Structure of the ETS<sup>26</sup>:**

- (i) Although TMG had previously decided to implement a “top-level” facility scheme that reduces emissions obligations by 1/2, it is very hard to obtain this qualification. In order to encourage more companies to strive for higher reductions, TMG also implemented a “quasi-top-level” scheme in which companies that were not able to achieve “top-level” were still rewarded with a 3/4 reduction in compliance factor.
- (ii) If the facility had one year in a consecutive series of three years in which a factory was closed for repairs or other issues that significantly affected emissions outputs, the average of 2 consecutive years around that time period may also be used for baseline emission calculation.
- (iii) For building rentals in which there is an owner and a tenant, the tenant of the building will become the responsible person for reduction if the tenant is renting over 5,000 sq. m. or is using more than 6 million kWh per year. In any case, regardless of size, all tenants must cooperate with the owner in order to calculate emissions.
- (iv) To establish baselines, facilities were required to use the average of three years from 2002-2007. In order to account for previous efforts during the voluntary scheme, TMG allowed companies to use any three years of the facilities choice.
- (v) In order not to rely too much on the ETS for reductions, companies are only allowed to credit reductions after they have verified the reductions instead of before like in the EU-ETS.

### **Use of Renewable Energy Credits<sup>27</sup>:**

- (ii) Under the residential solar energy implementation scheme, for two years starting from 2009, the government plans to give subsidies to 40,000 homes that install solar panels. The home owners purchases solar power equipment under this subsidy scheme relinquish 10 years worth of carbon credits to the public institution called “Cool Net Tokyo”.
- (iii) If power distribution companies in Tokyo install new sub-stations that increase the share of clean energy to a facility through the supply of clean energy from outside the TMG jurisdictional boundary, the facilities under the ETS can reduce their emissions without official certification if the percentage of consumed electricity from clean energy sources increases.
- (iv) Based on the above two points, the price of a credit should not fluctuate too wildly, but if the price rises inexplicably fast, TMG will consider the implementation of mitigative measures such as the issuance of credits from the small and medium sized business scheme, the ability to use the Clean Development Mechanisms, and other instruments.

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<sup>26</sup> Tokyo Metropolitan Government (2008) and Miyazawa (2010)

<sup>27</sup> Ibid.