The governance modes of the Tokyo Metropolitan Government Emissions Trading System

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1. Introduction[1]

The Kyoto Protocol focused on a new generation of global policy instruments to realize its target, the reduction of the world's greenhouse gas emissions. The flexibility mechanisms, namely emissions trading according to Article 17 (UNFCCC 1998), suggested the introduction of market-based policy instruments to mitigate global greenhouse gas (GHG) emissions (Helm and Hepburn 2009). It was assumed that such instruments would deliver the GHG reductions in an effective and efficient way, and would find better acceptance among stakeholders than classical command-and-control approaches commonly used in the area of environmental politics. However, at the time of writing this paper (November 2013) and several months after the Kyoto Protocol expired, only few countries and territories have implemented an emissions trading system (ETS), and the world is far away from anything like a global emissions trading system.

But then there are a few territories running or at least experimenting with ETS (Meckling 2011; Perdan and Azapagic 2011; World Bank 2012), and their number is growing. Among the territories where an ETS is already in place is the Tokyo prefecture, where the Metropolitan Government decided in June 2007 to implement an ETS by 2010. One of the most remarkable facts is that the Tokyo Metropolitan Government Emissions Trading System (TMG ETS) is the first trading system that basically only covers one city; another one is its success. In January 2013 the TMG announced a 23% reduction of CO2 emissions for the facilities covered against the base year 2009, stating that the reductions were not just caused by external factors like the global economic crisis or the Great Eastern Japanese Earthquake, and claiming that "significant reduction is expected to continue from here forward" (TMG 2013a: 1). Further supporting the claim that the reductions are not just driven by short term energy supply problems, but caused by the implementation of substantial and long term reduction measures, the TMG argues that the annual peak as well as average

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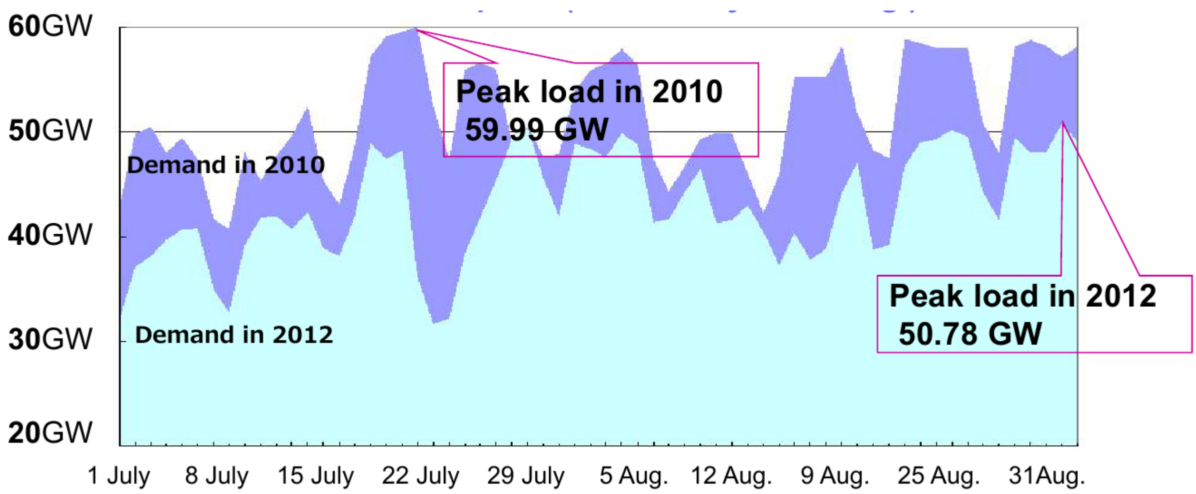
energy consumption in 2012, after the recovery from the Great Eastern Earthquake 2011 and the cascade of catastrophes it caused, are substantially and continuously below the values of 2010 (see Figure 1 below).

Figure 1: Peak Power Consumption in Tokyo in 2010 and 2012 (from 1 July to 31 August)



Source: TMG 2013b: 21

These results and the bold statements are even more remarkable when compared to the development of the flagship of emissions trading, the EU ETS. The EU ETS is by far the oldest, biggest, and in terms of trading, most active GHG emissions market (World Bank 2012: 10). However, due to the oversupply of emissions allowances in the system, it has not yet achieved any measurable CO2 reduction within the territory and business sectors it covers (EU Commission 2012; Niederhafner and Lee 2013, 204; Skjærseth and Wettestad 2010).

This raises the question of what the differences between the two systems are, and what features make the TMG ETS more successful than others. I use the EU ETS and its performance as the starting point for a case study analysis of the TMG ETS[2]. Applying an analytical governance concept, I conducted a policy analysis that investigates the design and features of the TMG ETS from the beginning of the program in 2010 onwards in the context of the economic, social, and political structure of the Tokyo metropolitan area and Japan. The empirical sections are based on publications by the TMG outlining the planning

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[2] For an introduction to the EU ETS refer to http://ec.europa.eu/clima/policies/ets/index_en.htm, accessed 11 November 2013 and Niederhafner and Lee 2013: 198-204.

and operating procedures and the performance evaluations of the ETS, which are available in English (TMG 2008, 2010, 2011, 2012a, 2012b, 2012c, 2013a, 2013b, 2013c), as well as on the few analytical publications (Lee and Colopinto 2010; Rudolph and Kawakatsu 2012; Satou and Yamamoto 2012) that are already available. In addition to a thorough analysis of the documents and the secondary literature, two standardized open-ended expert interviews with leading officials of the TMG were conducted in August 2013.

The paper is structured as follows: Section 2 outlines the analytical and conceptual framework; the specific logic of the Kyoto Protocol's market-based policy instruments is outlined in Section 2.2; Section 3 delivers the description and analysis of the TMG ETS; and Section 4 presents the conclusions.

2. Conceptual framework—different modes of governance and market-based instruments for GHG reduction

2.1 Different modes of governance

The theoretical approach to analyzing the TMG ETS design rests on the governance concept. Admittedly, governance approaches show a great variety of theoretical conceptualization and empirical application, the most obvious differentiation being between a normative and an analytical understanding of governance (Heinelt 2010; Hufty 2011; Jessop 2003: 142; Kooiman 1993, 2003; Pierre and Peters 2000). I use governance as an analytical concept to analyze the institutional arrangements in which both government and private actors at multiple levels cooperate in reciprocal interdependent relationships with each other, because neither the governmental nor the private actors can realize their goals without the other (Hooghe and Marks 2003; Pierre and Peters 2005: 83). The use of governance as an analytical instrument can be separated into two main approaches: those looking into 'governance systems' and those investigating 'governance modes'. Governance systems describe a given institutional setting from a rather holistic macro-level perspective, understood as the "*general* frame of reference" for the concerned actors (Heinelt 2010: 20, emphasis in the original). Not only, but specifically in political science, this perspective has focused on the general quality of a given regulatory regime or political system, the power of government in relation to other actors, and on how rules are set within a given system (Duit and Galaz 2008; Koimann 2003; Pierre and Peters 2005: 11–48; Rosenau and Czempiel 1992).

Given the research question of this paper, the focus rests less on the question about the democratic quality of governance in the Tokyo prefecture in general, but on the question of how GHG emissions reduction is achieved. Therefore, the governance mode perspective is applied, which analyses how the cooperation of societal actors is organized in a specific political area (Heinelt 2010: 20). Usually three ideal type governance modes are differentiated: market, hierarchy, and networks. These three governance modes are debated at length elsewhere (Marin and Mayntz 1991; Pierre and Peters 2000: 15–22; Powell 1990), but for the task at hand the conceptualization that follows will suffice.

The market mode refers to a system in which the role of the state is rather limited; market dynamics, created by the relation between supply and demand and informed by price signals are at the core of this mode. Private actors are the main actors; besides guaranteeing property rights and the functioning of the market principle, regulatory activity is unnecessary (Powell 1990: 300–302). The free allocation of resources in this mode enhances effectiveness and efficiency. However, it is quite difficult to aim for specific political goals with this mode if they are not directly creating profit—what includes most common goods, among them GHG reduction.

The hierarchy mode describes systems in which social action is mainly organized in a top-down fashion and via command-and-control relations (Powell 1990: 302). Preconditions are power and competence differences between the actors and the possibility of using sanctions against noncompliance. Targeting specific goals, including those directed at common goods, is comparatively easy. However, the identification of the optimal goals and their efficient realization are, especially in the long run, difficult to achieve.

The network mode is not as clear-cut as the previous two (Hafner-Burton, Kahler, and Montgomery 2009; Rhodes 1997: 36–45; Scott 2011). In networks, social interaction is basically coordinated horizontally and according to common interests; most relevant is mutual trust between the participating actors. Exit costs are comparatively low and sanctioning powers are rather limited. In comparison to market transactions, the interactions are more stable and long-term. Given a shared interest among the participating actors, networks can realize common goals; however, they have to cope with the free-rider problem (Cole 2009; Hardin 1968; Ostrom 2008).

Environmental protection policy, which by definition addresses a common good, has been commonly regulated by applying the hierarchy mode of governance. The government defines the common good as well as the regulation and standards necessary to protect it. Sanctions are taken against noncompliance with these norms and standards. The Kyoto Protocol, however, introduced a different approach to aiming for GHG emissions reduction.

2.2 Reducing GHG emissions with a market-based approach

The Kyoto Protocol and its flexibility mechanisms, especially emissions trading according to Article 17 (UNFCCC 1998), aim for “market-mimicking forms of regulation” (Campbell, Klaes, and Bignell 2010: 164). Since GHG emissions do not have automatically—to avoid the term ‘naturally’—a price tag, markets have to be set up by regulatory activity. In a nutshell, the implementation of an emissions trading system starts with ascertaining the total emissions of a given territory. Then a politically decided cap is introduced, determining to what extent this total amount should decreased or increased. The ruling authority hands out certificates, usually called allowances, each of which allows the emission of a specific share of the total. The global standard is, with the exception of USA and Canada, one metric tonne of carbon dioxide equivalent (CO2e) emissions per allowance. Each facility covered by the ETS is given a specific number of allowances, which entitles that facility to emit the equivalent amount of GHG. The total of these certified emissions equals the amount determined by the cap. GHG producing actors are punished for emitting more GHG than they have allowances for.

If a facility wants to increase production, it can either achieve this without increasing its emissions, for example by increasing the efficiency of its energy usage, or it can buy additional allowances from other actors willing to sell. Depending on the specific prices for technological innovation and equipment, some facilities can reduce their GHG emissions to a lower price than others. Depending on the marginal prices of the reduction, it becomes profitable for some companies to reduce beyond the own reduction target and offer the extra allowances for a profit in the market. And for other companies, reductions within their own facility could require such high costs that it could be cheaper to buy available allowances. Thereby, supply and demand are created, and a market for the allowances is established. In particular, authors applying economic models to emissions trading have, *ceteris paribus*, proven convincingly that the trading of emission allowances is an effective and especially efficient way to reduce CO2 emissions. The price signal helps to guide investment to those projects that will realize the biggest GHG reduction for the least cost. In this way, the introduction of market-based governance reduces the overall societal costs of environmental protection, and secures the optimal allocation of resources (within the setting of the regulatory framework). Last but not least, the public acceptance of such a tool is, given the advantages mentioned above, expected to be much higher than, for example, carbon taxes or other conventional instruments of environmental protection (Aldy and Stavins 2011; Antes et al. 2008; Helm and Hepburn 2009; Mathys and Melo 2011; Schreuder 2009; Stern 2008).

Applied to the real world, at least if we look at the EU ETS, the situation presents itself differently. The responsible actors in the EU, namely the EU Commission, have tried to engineer the system in way that actually achieves reductions, but unsuccessfully so far. After the system suffered from a general over-allocation of emission allowances in the first place during the phase 2005-2007, their number was reduced in the second phase 2008-2012. But the economic slowdown caused by the global financial crisis starting in late 2008, and recently mild winters, have reduced total energy consumption and thereby the GHG emissions within the EU ETS territory. Paradoxically, the total amount of EU CO2 emissions was in fact reduced and stayed within the EU's Kyoto Protocol target (EU Commission 2013). But this is not due to the ETS, since even the reduced amount of allowances in the second phase was much too high to initiate a functioning supply–demand price mechanism. That means as of now, the EU ETS cannot be made responsible for any CO2 emissions reduction (EU Commission 2012: 4–5; Niederhafner and Lee 2013: 204).

Given the EU experience, the outlook for emissions trading in the Tokyo prefecture seems to be not very bright. In comparison to the EU, the Tokyo prefecture did not only have to deal with the impact of the global financial crisis, but additionally with the impact of the March 2011 Great East Japan Earthquake, the tsunami it provoked, and the multiple meltdowns at the Fukushima Daiichi nuclear power plant. Against the backdrop of the development in the EU, two assumptions can be made: firstly, the Tokyo prefecture will have a significant reduction of GHG emissions, due to the external factors driving down energy consumption; and secondly, similar to the EU ETS case, the ETS as such is not a causal factor in the reduction, which of course would contradict the TMG's own evaluation of the system. The following sections analyze whether or not the TMG ETS is responsible for the GHG reductions.

3. The Tokyo Metropolitan Government Emissions Trading System

3.1 The political and economic context

That the TMG ETS covers only one city has to be put in perspective, since Tokyo beats most nation states in terms of its population, GDP, and, as a matter of fact, its GHG emissions. "Greater Tokyo" is the most populous urban agglomeration on earth with approximately 36 million inhabitants and with a GDP of ¥165 trillion (in 2008, approximately €1.3 trillion or US$1.9 trillion), it is the largest metropolitan economy in the world (PricewaterhouseCoopers 2009:22).

At the centre of Greater Tokyo is the Tokyo prefecture, the entity that is addressed as Tokyo through the rest of this paper, which is one of 47 Japanese prefectures. Its legislature is the 127 person strong Tokyo Metropolitan Assembly. The executive, the Tokyo Metropolitan Government, is led by the Tokyo City Governor who is directly elected for a four-year term.

The Tokyo prefecture itself counts for 13.19 million residents (2011), with a population density of 6,029 persons per square kilometre (TMG 2012: 5), and it hosts 51 of the Fortune Global 500 companies, more than any other city[3]. Of its employment, 77.4% is in the tertiary sector (TMG 2012: 11). In terms of GHG emissions, with a total of 59.6 million tonnes in 2006, the Tokyo prefecture would rank between Sweden and Norway, the global number 28 and 29, respectively (TMG 2010: 6).

In March 2008, on the initiative of Governor Shintaro Ishihara, the "Tokyo Metropolitan Environmental Master Plan" was approved: a holistic concept to develop Tokyo's future in a systematic and sustainable way and make it "the city with the lowest environmental impact in the world" (TMG 2008: 2). Among other targets within this master plan, Tokyo decided to reduce its GHG emissions by 25% by 2020, compared to the baseline year 2000 (TMG 2010: 13). The TMG ETS is one of the most relevant policies for realizing this goal. The system started in April 2010 and so far two five-year phases from 2010 until 2014 and from 2015 until 2019 are planned. It covers all facilities within the Tokyo prefecture with an average annual energy consumption of above 15 GWh[4] during a given fiscal year (running from 1 April to 31 March). Of the total energy consumed in Tokyo, including for transportation, 40% is electricity. This means the system focuses its operation mainly on electricity consumption rather than other forms of energy. However, 90% of that electricity is generated outside the Tokyo prefecture (TMG 2010: 9), meaning that the electricity producers themselves are not subject to the ETS. The TMG could therefore be called an indirect ETS, since the actual physical CO2 reduction is not achieved within the ETS and not on Tokyo prefecture territory (for details of the energy consumption and GHG emissions of Tokyo see TMG 2010: 6–10). In 2011, a total of 1348 facilities were covered by the system (TMG), which were responsible for approximately 40% of all emissions induced by commercial and industry facilities and 20% of the total CO2 emissions of Tokyo (Rudolph and Kawakatsu 2012: 9).

At the time of writing this paper (November 2013), the system had only gone through two

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[3] http://en.wikipedia.org/wiki/Tokyo (October, 15 2013).

[4] The unit used by the TMG is 1500 kilolitres crude oil equivalent (TMG 2010: 11), which translates according to data from BP available at http://www.bp.com/conversionfactors.jsp (August 20, 2013) into 1500 × 0.85 tonnes oil equivalent × 12 megawatt hours = 15300 megawatt hours or 15.3 gigawatt hours (GWh) annual energy consumption. The unit crude oil equivalent is rather uncommon in the existing political science literature on energy politics, and generally used for thermal energy. The TMG, however, focuses mainly on electricity consumption. To enhance simplicity and enable comparisons with other literature in the field, I use henceforth the GWh unit.

fiscal year cycles of CO_2 emissions reporting-and-reduction verification. This is, however, sufficient for an analysis of the system's major functioning principles and to give first indications of its performance. To this end, the next section explores the targets for compliance within the TMG ETS.

3.2 Target setting of and compliance with the TMG ETS reduction targets

Every facility covered by the TMG ETS had to choose a period of three consecutive years from the fiscal years 2002–2007 which were used by the TMG to calculate the facility-specific "base year consumption" (TMG 2012a: 19). In its first phase until 2014, the system requires all "business facilities," which include mainly factories as well as solid and liquid waste treatment facilities, to reduce their CO_2 emissions by 6%; it also requires all "office facilities," which include all other buildings, for example offices, schools, hotels, hospitals, cinemas, and wedding halls, to reduce emissions by 8% each year against the specific baseline year value (TMG 2012a: 24). For the second phase, the reduction targets were set at 17% for office facilities, and 15% for business facilities against the baseline year value (Interview I).

Every November, the facilities covered by the ETS are obliged to report their energy input and their CO_2 output in the previous year to the TMG. Prior to submission, the numbers have to be verified by an officially certified third-party "verifying agency." Currently, 30 of such verifying agencies are registered with the TMG (TMG 2012a: 50–52).

In the first year of the ETS, according to the TMG, all 1348 facilities covered by the TMG ETS submitted their mandatory energy consumption and CO_2 emissions reports (Interview I). The TMG then examined the accuracy of the reports. By the time the TMG press release on the ETS outcome (TMG 2012b), the basis for this analysis, was prepared, 1159 reports were examined and used to calculate the total reduction (Interview I). That resulted in a database of approximately 86% of all reports. The total reduction achieved by these facilities was at 13% (TMG 2012b) for the first year of compliance (2010) against the baseline year total. This result was topped in the second year (2011), when a reduction of 23% was announced on the basis of 934 examined reports (approximately 69% of the total) (TMG 2013a). Furthermore, while in the first fiscal year (2010) 64% of all facilities achieved a reduction higher than their given compliance target, in 2011 that was the case for 93%; 70% of the facilities had already realized their reduction target for the second phase, a reduction of CO_2 emissions by 17% (see Figure 2 below). Last but not least, while 36% of the approximately 86% of facilities whose reports were used for the TMG ETS evaluation did not achieve their reduction goal in the first fiscal year, that dropped to 7% of the 69% reports used for the second fiscal year (TMG 2013a, own calculations).

3.3 Evaluation of the target compliance

As of September 2013, the TMG ETS is apparently a big success. The participating companies did not just comply with the imposed 6% or 8% CO_2 emissions reduction targets respectively, but reduced their total CO_2 output by 23%. Since this is the aggregated value for all facilities covered, it would be possible that a few companies had achieved tremendous reductions, while the majority of facilities failed. However, the total number of facilities that failed their compliance target decreased as well, while the number of overachievers increased. This suggests that the high reduction was not caused by just a few individual overachievers, but by a broad base of facilities.

However, the general economic slowdown due to the global financial crisis starting in 2008 has to be taken into account as well. As mentioned above, the impact of this crisis is one of the major factors in why the EU ETS could not cope with the problem of allowance overallocation. And the Japanese economy, relying strongly on the exports of high tech and high quality products, struggled seriously with the impact of the global financial crisis as well. That the global economic downturn influenced Tokyo's CO_2 emissions is strongly suggested by the fact that in 2010, the biggest reductions of 22% were achieved by factories and waste management facilities (see Table 1) in sectors hit heavily by the slowdown in production and consumption due to the financial crisis. In contrast, the reductions were not as high in sectors that show generally greater resilience to exogenous economic shocks, like the medical or the education sector with a 7% and 5% reduction, respectively (TMG 2012b).

Furthermore, during the accounted timeframe Japan was hit by the Great East Japan Earthquake, the tsunami it provoked, and the multiple meltdowns at the Fukushima Daiichi nuclear power plant. As a result and in addition to the economic decline caused by the global financial crisis that started in 2008, Japan (including Tokyo) suffered and is suffering from various events that have reduced energy consumption. In the immediate aftermath of the earthquake power outages occurred due to grid and power plant failures, and at the time of writing, various mandatory energy saving measures are being applied at the national and prefectural level to balance Japanese energy consumption in general, and especially Tokyo's. These energy saving measures have been enforced, since after the tsunami and then in September 2013 all nuclear reactors were eventually taken off the grid for control activities (Reuters 2013), and many of them completely shut down[5].

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[5] On a side note: This makes Japan the first highly industrialized country with a significant production sector that stopped de facto completely the use of electricity from own nuclear production. In Germany, where the termination of nuclear energy production is a very prominent policy, nuclear power plants are allowed to supply

Table 1: Facilities emission and reduction rates in the fiscal year 2010, by sector

Usage of Facilities	Number of Covered Facilities	Base-Year Emissions ($t-CO_2$)	Emissions in FY2010 ($t-CO_2$)	Emission Reduction Rate (%)	Reference: Average Base-Year Emissions per Facility ($t-CO_2$)
Commercial Sector	970	8,302,326	7,418,087	11%	8,559
Office	509	4,176,696	3,656,371	12%	8,206
Information Communication Center	32	375,389	373,260	1%	11,731
Broadcasting Station	5	96,099	90,204	6%	19,220
Commercial Facility	172	1,216,026	1,095,963	10%	7,070
Accommodation	41	475,318	437,529	8%	11,593
Educational Facility	57	470,686	447,350	5%	8,258
Medical Facility	64	542,639	503,563	7%	8,479
Cultural Facility	24	149,427	130,595	13%	6,226
Distribution Center	20	145,864	129,129	11%	7,293
Heat Supplier	46	654,182	554,123	15%	14,221
Industrial Sector	189	2,906,270	2,345,869	19%	15,377
Factory	134	2,253,308	1,756,379	22%	16,816
Waterworks/Sewerage	39	481,658	455,639	5%	12,350
Waste Management	16	171,304	133,851	22%	10,707
Total	1,159	11,208,596	9,763,956	13%	9,671

Source: TMG 2012b: 1

Despite the various factors that have contributed to the reduction of energy consumption of the facilities targeted by the TMG ETS, the administration stated in its report on the first year results that the impact of this catastrophe was only of limited duration and that "these significant emissions reductions were not mainly the result of the earthquake" or, for that matter, of the economic crisis, but "of active reduction measures undertaken by covered facilities" (TMG 2012b).

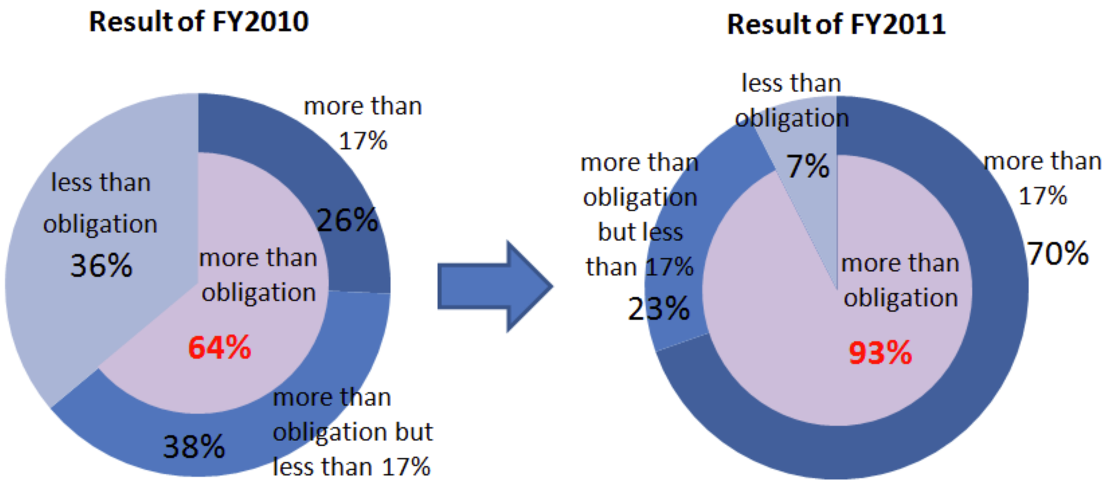
The TMG is convinced that in the event that the Japanese economy recovers (or even experiences a boom) during the remaining years of the first compliance phase, the compliance targets of 6% or 8%, respectively, will be met without any problems (Interview I). From the position of the administration, the reduction targets for the second phase (starting from 2015), set in late 2013 at 17% for the category of office facilities, and 15% for the category of business facilities (Interview I), could actually be raised since 70% of the facilities with examined reports achieved reductions of 17% or more in the fiscal year 2011 (see Figure 2).

However, with a view to the overall success of the policy we have to bear in mind that the data presented in Figure 2 only represents the facilities whose reports had been examined at the time the TMG prepared its press releases; that is, those that had submitted reports to the

electricity until 2022. The Japanese Government under Prime Minister Abe, a strong supporter of the nuclear industry, however, continues to emphasize that nuclear electricity production is indispensable for Japan and has announced repeatedly that the first reactors are soon to return to the grid.

TMG, which were 86% of the total for 2010 and 69% of the total for 2011. It is possible that the numbers concerning the overall reduction as well as the low 7% non-compliance rate in 2011 will have to be corrected once all the reports are examined.

Figure 2: Target compliance in the fiscal year (FY) 2010 and 2011



Source: (TMG 2013a: 2)

In relation to that, in 2010 there were several areas that on average failed to meet the targets, such as information communication centers, which only achieved a 1% reduction, or the educational facilities with a 5% reduction (see Table 1). Last, the numbers presented here are aggregated data; it is therefore reasonable to assume that even in the categories with greater reductions, such as the factories, there were one or more specific sites that failed to comply. As a result, an educated guess is that there were a considerable number of facilities that have not been able to meet the reduction target by their own on-site activities so far, and that the final value for non-compliance will probably be significantly higher than 7%.

For a hierarchy mode policy based on command-and-control mechanisms, a rate of 7% or higher for noncompliance would be a serious challenge. Furthermore, a classical command-and-control policy design would be expected to react to noncompliance with the reduction target at the end of a fiscal year by imposing immediate penalties, but this was not the case in the TMG ETS (Interview I). Instead, the compliance for the whole first phase will be assessed once and at the end of the first phase, which will fall in the sixth fiscal year of the system in 2015. If a facility cannot deliver certifiable reduction efforts in compliance with its reduction target, and cannot deliver a sufficient amount of additional allowances by the end of 2015, it is subject to penalties. The first step will be that an order is issued against the facility requiring it to deliver 1.3 times the allowances originally required to offset its emissions in a timeframe set by the order. If the facility fails to comply again and violates the order, the name of the company will be published, the Tokyo Governor will purchase the missing allowances on the market and bill the facility's operator with the costs, who is also subject to a fine of up to ¥ 500,000 (in October 2013 approximately €3700 euros or US$5100) (TMG 2012a: 54).

However, to meet its reduction target at the end of a compliance phase, a facility does not only have the option of reducing its own emissions by the necessary amount. Instead, it could buy emissions credits to offset its surplus emissions. The next sections outline how market mode governance elements are integrated into the TMG ETS.

3.4 Regulatory settings for the trade in emissions allowances

At the core of the emissions trading regulations, the TMG follows the same principles as those applied by the Kyoto Protocol and EU ETS. The basic reference unit for trading is an allowance issued by the TMG (henceforth called Tokyo emission allowance (TEA)), which permits the emission of one metric tonne of CO2. Each installation receives a specific number of allowances free of charge based on their baseline emissions (see Section 3.2 above) minus the compliance factor of 6% or 8%, depending on type of facility, which are allocated for the whole five years of the first phase (TMG 2010: 19). As in the EU ETS, these allowances only exist virtually as a unit of calculation. The TEA accounts are held only by the TMG and are free of charge to every facility covered by the TMG ETS; other account holders are charged ¥13,400 (TMG 2012: 45). Banking allowances during one phase as well as from Phase 1 to Phase 2 is possible, but borrowing is not.

However, the scheme has a few unique features, in comparison to the EU ETS. The TMG, holding the accounts only permits the transfer from one account to another if the seller has proven by an annual verified reduction report that the facility not only achieved its mandatory compliance factor, but achieved further reduction (Interview I). Only the TEA amount that exceeds the reduction target is saleable. And there is another limitation: a facility can only sell a maximum of 50% of the total baseline emission allowances grandfathered to the installation in first place (TMG 2012a: 32). Besides securing these two regulations, the TMG does not interfere with the transactions of tradable TEAs, and "will not take a role in setting carbon prices, nor will it set upper or lower limits, or other restrictions, on prices" (TMG 2012a: 43).

That means by design, that trading can start only from the moment the TGM has verified the first reported surplus reductions. So far, the amount of trade is very limited. The TMG registered four transactions in the first and six in the second fiscal year. However, for the first five months of the fiscal year 2013-2014, seven trades have already been registered (Interview I).

In addition to the trade between the facilities covered by the TMG ETS, four types of offset credits are allowed to be registered to a facilities' account, all but one from the fiscal year 2011 onwards (TMG 2012: 31–40). Generally, these offset credits were introduced to offer the facilities and operators a greater choice to meet their compliance obligations. However, they each have additional targets:

- Emission Reduction Credits from small and midsize facilities in Tokyo. These credits allow the integration of facilities that have a primary energy consumption which is too low to be covered by the ETS directly. Therefore, the scope of the TMG ETS is widened. This allows companies with various facilities, corporate bodies, and affiliated companies to develop integrated and comprehensive energy saving strategies[6].
- Renewable Energy Credits. These credits can be issued by verification agencies all over Japan for energy that is produced by renewable power sources. These credits serve to support the build up of renewable energy production, one of the major overall goals of the TMG. Accordingly, credits created by solar power facilities are translated by a factor of 1.5 into TEAs.
- Saitama Credits. These are credits issued by the Saitama prefecture, a neighbouring territory of Tokyo, and part of the Greater Tokyo Metropolitan Area. Allowing Saitama credits is seen as a tool for the future integration of neighbouring districts into the TMG ETS (Interview I). Such credits should help companies that run several facilities within and beyond Tokyo's city limits to develop comprehensive energy saving strategies. More importantly, such credits would allow for the future integration of the energy production sector. As mentioned above, most of the power plants delivering electricity to Tokyo are not located within the TMG territory.
- Credits for emission reductions outside Greater Tokyo. These emission reductions are not yet integrated to the TMG ETS yet; this is planned for 2015 (TMG 2012a: 31). According to current planning, these credits will be issued on reductions achieved for a minimum of five years and not before 2015. The facilities and the reductions must

[6] The Japanese economy is dominated by the so called *keiretsu*: huge organizations with several production and service sectors encompassing conglomerates of companies of varying sizes and degrees of autonomy.

generally meet the standards of the TMG ETS. The measures outside Tokyo must not “negatively impact the reduction effort within Tokyo” (TMG 2012a: 35). In the long run, these credits should support the introduction of an all-Japan ETS.

All offset credits have to be verified by a TMG-registered verification agency, and then submitted for approval to the TMG, which then registers the credits in the TEA account. (TMG 2010: 12). Excess allowances and offset credits registered in an account can be banked and transferred from the first to the second compliance phase. However, they will not be transferable to the third phase starting in 2020 (TMG 2012a: 31).

Kyoto Protocol allowances or EU ETS allowances are not accepted by the TMG. The TMG is aware that the integration of such allowances is a possibility, and generally supports the idea of global emissions trading. However, the Tokyo TMG wants to secure that the reductions are actually achieved by operators from Tokyo and within the city limits. The main target is to reduce the GHG output of Tokyo itself, according to the Tokyo Environmental Master Plan mentioned in Section 3.1. Therefore, offsetting is evaluated very carefully, and the integration of further offset possibilities is not a priority (Interview II). But in a situation where an insufficient supply of TEAs led to price surges, the TMG would use various strategies to increase the number of available offset credits, like supporting the installation of solar electricity generation by cheap credit (TMG 2012: 42).

3.5 Evaluation of the regulatory settings for the trade of emission allowances

Facilities covered by the TGM ETS can, but are not obliged to reduce their own emissions. Instead, they can choose to buy the necessary TEA or offset credits on the market. Given the substantial sanctions described in Section 3.3, and given that every facility is targeted with a specific reduction amount, it is highly likely that sufficient demand will be created. Concerning the creation of a sufficient TEA supply, two interesting limitations can be observed. Firstly, the companies have to meet their reduction goals first before they can start selling. In the beginning, there was no TEA supply eligible for sale in the system. This is a difference to systems where trading is allowed without any limits and from the first day on, such as the EU ETS. The supply will build up over the years, but only if there are actors that reduce their emissions beyond their own compliance target. This explains the low numbers of trading actions which have been so far recorded in the market. Secondly, the total supply is limited by the rule that TEA sales are limited to 50% of the total baseline year emissions only. This prevents companies that could easily achieve extreme reductions (due to cheap technological options) from flooding the market with large quantities of TEAs. In consequence, the total possible amount of saleable TEAs is only 50% of the total amount of TEAs issued by the TMG. Apparently, the TMG ETS is less prone to a destabilizing oversupply of TEAs in the market than other ETS. That the offset credits are limited to Japanese credits only, and that the TMG is in charge of verifying and accounting for them, further contributes to that. It seems that the TMG ETS would be more vulnerable to a supply shortage than to an oversupply of TEAs. However, to address the danger of unsustainable TEA price surges the TMG has already announced to have various instruments in readiness that would create additional offset credits and raise supply (TMG 2012a:42).

However, given the short time that the TMG trading system has been actually in place and the low amount of TEA transfers registered in the system, the price mechanism itself can hardly be the cause of the GHG emission reductions described above. And neither can it be the sanctions, since they are not even applied yet. At this point, another governance element of the TMG ETS policy design moves into focus: the “top-level facilities” certification program.

3.6 The TMG advisory system and the top-level facilities program

When the policy design of the TMG ETS is examined it becomes apparent that it contains various elements that fit neither the hierarchical nor the market mode of governance. The TMG maintains an extensive consultation and advisory service, including a certification program for the best performing facilities, which will be described below. However, to understand this aspect of the TMG ETS it is necessary to understand its predecessor, the “TMG Carbon Reduction Reporting Program[7]”.

3.6.1 The TMG Carbon Reduction Reporting Program

Starting in 2002, this program was a mandatory reporting system for large facilities with high CO2 emissions, basically the same installations that are now covered by the ETS. The operators had to deliver their emissions data annually and to provide a three-year plan about CO2 reduction activities. Even though reporting was mandatory, the actual reductions were voluntary (TMG 2011: 6). The TMG played a very active role in this program, evaluating the reduction plans and giving specific advice to enhance already included measures and to inform about alternative or additional options. To be able to provide such a service in the necessary quality and quantity, the TMG had to build up adequate capacity, especially concerning its personnel base of qualified engineers and other energy and/or emission technology experts. The related units were integrated with the TMG Environmental Bureau, which was (and still is) responsible for the program (Interview I). In 2005, a web-based information catalogue was introduced, which included a publicly available website with

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[7] As of 2013, this is the new official name of the previously called “CO2 Emission Reduction Program” (Interview II).

information on specific companies' actions and their ranking. These modifications enhanced the impact of the program dramatically. The ranking put the companies in public competition with each other about their reduction achievements, and the electronic database allowed the TMG staff to gather information about and further develop successful measures, and give faster more specific advice. In the early years, the program concentrated on short-term measures that realized paybacks within less than three years (Interview I).

The Carbon Reduction Reporting Program has been evaluated as being very successful, not for its actual CO2 reduction effect, which according to Rudolph and Kawakatsu was only 2% for the period 2002–2005 (Rudolph and Kawakatsu 2012: 8), but for the impact it has had on the capacity building of the actors involved. The TMG administration had to build up its capacity to monitor the facilities and advise their operators. This included the employment of appropriately trained staff, learning about feasible and successful CO2 monitoring, and the establishment of databases on energy and CO2 reduction measures. The operators built up the necessary capacity as well; for example, they established energy savings offices and employed specialized personnel who did not just look for "end-of-the-pipe" actions, but sought to integrate efficiency and effectiveness measures in the complete production and business operation processes. The program raised awareness of energy consumption and, especially with the short term measures, the insight that environmental measures were able to reduce costs or even to generate profits. The publication of the ranking helped the business actors to see environmental sustainability as a marketing instrument and as an essential part of corporate social responsibility. Last, the program sent a clear signal to the companies that CO2 reduction is a long term and well followed-up policy target of the TMG, and the program established long-term relations and trust between the administration and business operators.

In 2010, the entities covered by the Carbon Reduction Reporting Program were moved to the ETS. The Carbon Reduction Reporting Program was not abolished, though. Applying basically the same structure and procedures, it is now responsible for small- and medium-sized facilities (TMG 2011).

3.6.2 The TMG ETS advisory system

One of the main differences between the TMG ETS and the Carbon Reduction Reporting Program is that now reduction is mandatory. As explained above, the compliance target was set at 6% or 8%, depending on facility type, for CO2 emissions reductions in the first phase until 2015. As in the previous program, companies are obliged to deliver annual reports, but now the numbers have to be verified by one of the verification agencies registered with the TMG before the reports are submitted. The TMG checks the reports and approves the reductions. However, this is not the only role of the administration. Similar to the previous program, the TMG provides a comprehensive consultation and advisory service to the companies subject to the ETS.

The basic principles of energy and GHG emissions reporting applied within the TMG ETS were already used by other authorities, especially the UK, but the EU experience with emissions trading were also taken into account during the design of the Tokyo system. But the idea of building up the database and an “energy consulting service,” including making recommendations on specific technological solutions and equipment as a part of the TMG ETS design, originated within the TMG administration and is closely related to the experience gained from the previous reporting program (Interview I). The majority of staff currently responsible for the GHG reduction programs are actually mainly busy with advising operators about possible measures. To secure a high quality of service and advice, the TMG employees are continuously educated, and the electronic information and database system is being further developed as well (Interview I). The TMG officers visit the facilities, evaluate the situation on site, and elaborate plans involving adequate energy saving measures. Due to the close contact with the companies, the TMG officers have quite a good knowledge of the situation on site at the various installations. This helps them to suggest adequate measures, to support continuous effort, and to supervise actual energy reductions. The companies that are lagging behind in their efforts receive more visits and more detailed advice than companies that are doing well in their reductions (Interview I). According to TMG information, in 2013 a total of around 5,500 reduction measures have been implemented over the period of the last 5 years (TMG 2013b).

In general, the measures suggested by the TMG are only voluntary actions and the companies are not obliged to implement them. However, there is a feature of the TMG ETS that requires mandatory energy consumption reduction measures: certification as a “near-top-level” or “top-level facility.”

3.6.3 The top-level facility certification programme

The idea of certifying facilities with “near-top-level” or “top-level facility” status was already included in the Carbon Reduction Reporting Program as well. In the TMG ETS, certifications are given to installations that implement a list of mandatory measures in the area of “energy performance of buildings and equipment” as well as “energy management” (TMG 2012a: 25 - 26). Certification is granted by the governor of Tokyo, subject to regular supervision, and published. The catalogue of measures that have to be realized is rather extensive (see Table 2). To be classified as a top-level office type facility, for example an office type facility has to verify the implementation of all 74 mandatory (see column one, Table 1) plus 99 general measures, the latter to be implemented “on a priority basis” (TMG 2012a: 25); for the near top-level certificate, the numbers are somewhat lower (TMG 2012a: 25). Measures of the category A in Table 2 are voluntary activities that grant additional points for the certification.

Table 2: Total number of measures for the top-level certification

Evaluation items	Group I (office, etc)			Group I (DHC)			Factory and others			Waterworks plant			Sewage treatment			Waste disposal plant		
	M	G	A	M	G	A	M	G	A	M	G	A	M	G	A	M	G	A
I. General	23	4	1	23	3	1	22	6	1	22	6	1	22	6	1	22	6	1
II. Energy performance of building and equipment	26	39	45	22	31	30	16	50	124	14	29	92	18	42	93	16	33	97
III. Energy management	25	56	9	23	47	9	35	61	49	25	49	31	25	48	34	26	42	31
Subtotal	74	99	55	68	81	40	73	117	174	61	84	124	65	96	128	64	81	129
Total (mandatory + general)	228(173)			189(149)			364(190)			269(145)			289(161)			274(145)		

M: Mandatory G: General A: Additional

Source: TMG 2012a: 25

Further, facilities that acquire one of these certifications get a reduction on their compliance target, meaning their 6% or 8% reduction target is reduced. Top-level facilities receive a 50%, and near-top-level facilities a 25% reduction of their specific reduction target (Tokyo 2012a: 25).

That the top-runners should get their compliance targets reduced seems odd at first glance, after all they have implemented numerous mandatory and voluntary measures to reduce their CO2 output with great success and can easily achieve the target. Moreover, if they only needed to reduce by a lower amount, they would consequently eventually realize lower reductions, which would be at odds with their overachiever status. However, the idea of reducing their compliance target makes sense if emissions trading is taken into account. The reduced reduction obligation actually means that these operators can sell more allowances on the market, since TEAs can only be sold only after the compliance target is reached. The certification secures that these facilities implement a catalogue of mandatory measures and perform extraordinarily well in terms of energy and CO2 emissions reduction anyway. Since top-level facilities can realize higher profits on their investment in reduction, operators have a great incentive to not just realize the minimum reduction necessary, but to maximize possible reductions.

In the fiscal year 2011, 15 office type facilities and 3 factory type facilities received the top-level certificate, in case of the near-top-level certificate it were 31 and 3. That means around 4% of the facilities covered by the TMG ETS received a certification, among them not only new, but as well old facilities (TMG 2013c: 23).

3.7 Evaluation of the TMG ETS advisory programme

The accompanying advisory system built into the TMG ETS is apparently the major cause of the high level of emissions reduction the system has already achieved. During the time of its predecessor, the TMG established capacities to advise and guide Tokyo's businesses towards reducing energy consumption, and thereby CO2 emissions reduction. And the companies learned to value the related measures as well. Under the ETS regime, the compliance targets are now mandatory, but the advisory activity of the TMG and the top-level facilities certification program remain major factors in the high level of reductions achieved by the system. Participation in the certification programme is voluntary; however, there are strong incentives to do so. There are not only various 'soft' benefits, for example the public ranking that can be used for public relations purposes, but big monetary incentives are also included. Assuming the market picks up in the coming years, allowing the top-level facilities to sell more TEAs in the market could result in substantial additional profits. As a side-effect, this feature will help to avoid the problem of insufficient TEA supply addressed in Section 3.5.

Last, and even if it is hard to quantify, the establishment of personal relations and the build-up of mutual trust plays a major role, and this was strongly emphasized during the interviews (Interview I, II). Due to the close contact of the TMG administration with the operators, its knowledge about the activities implemented and technical innovations is rather detailed. According to TMG, these activities are of such an all-encompassing quality that even if the Japanese economy starts booming again, a significant reduction will be achieved compared to the situation before the TMG ETS (TMG 2013a). Even though such predictions about the future are always risky, this assessment seems to be much more reliable than it would have been without TMG's knowledge of the business activities and the close contact between the actors.

4. Conclusions

This paper has given an explanation of why the TMG ETS is apparently more successful than the older and much bigger EU ETS. This refers not just to greater success in terms of actual emissions reduction measured in percentages of CO2 mitigation against the specific baseline year. In both territories, actual GHG emission reduction was achieved. But it is difficult to make the EU ETS responsible for the reductions, since the EU's CO2 emissions decrease is mainly caused by other factors. In contrast, the reduction of energy consumption and the decrease of emissions under the Tokyo ETS are according to the TMG so big that they cannot be explained by external factors only. Whether this assessment is still valid if the Tokyo economy goes into an economic boom phase, as the TMG predicts, remains to be seen. However, given the high amount of the total reductions, already surpassing the targets planned for the second phase from 2015 onwards, it seems highly plausible that TMG ETS will contribute significantly to Tokyo's target of reducing CO_2 emissions by 25% by 2020, compared to the baseline year 2000.

Interestingly, this is not much caused by the market-mode governance elements of the ETS, which play a rather small role. In the TMG ETS, both sides of a market, but the supply side even more than the demand side, are much more regulated than a neo-liberal understanding of the market would appreciate. One can expect that TEA trading activity will pick up over the years, especially at the end of a compliance phase. But in the TMG ETS the TEA market is by design more a place where underachievers, unable or unwilling to reduce their own GHG emissions, can buy allowances to evade being penalized, instead of the main driver for CO_2 reduction. In an institutional design such as the TMG ETS the carbon market will hardly ever play the main role it was supposed to play within a system like the EU ETS.

But the TMG ETS does not fall nicely within the hierarchical mode of governance either. Whether and how the facilities achieve their reductions is at their own discretion. Even no action other than buying allowances from others is acceptable. The only two elements that can be clearly assigned to the 'classical' environmental policy standard setting are the compliance targets imposed on the facilities, and the penalties in case of non-compliance at the end of a phase. However, these two elements of coercion are necessary to set up a carbon market in the first place, and are found in the EU system as well.

If the reductions are not only caused by external factors, and the analysis above suggests that neither the market nor the hierarchy governance elements are the actual cause for the success of the ETS, then the advisory system and the close cooperation of TMG and facility operators remain as the explanatory factors. Apparently, it is the role the TMG plays as a councillor, activator, and motivator that supports the companies in their compliance efforts that makes the difference. Close cooperation and the regular and long-term contact between the relevant personnel in administration and businesses, as well as the obvious trust between the participants, allows the TMG to steer the operators more effectively towards compliance and seems to be causal for the mitigation achievements. Against the backdrop of the different governance modes (introduced in Section 2), this allows the conclusion to be reached that in the TMG ETS both the hierarchical and the market-mode governance are actually complemented by strong network governance elements, and the latter make the system a success. This result should, however, be verified by further research, for example on the motivation for reduction on the business side and the degree to which they follow the

TMG’s advice.

As for the question about why this system presents these specific features, I would strongly suggest that cultural elements need to be considered. Policies involving elements of close cooperation between government and business actors are traditionally prevalent in East Asia (Katzenstein 2005; Pape 1999). Other examples have been described (Kimura 2010; Niederhafner and Lee 2013; Nordqvist 2006). In general, trust in the market as the superior mode of social organization is not as dominant as in the Western hemisphere, and ‘social engineering’ is more highly valued (Mahbubani 2010). However, to what extent such a cultural variable is in fact explaining the design of an ETS and the behaviour of the relevant actors needs to be addressed by future research as well.

Even though Japan and Tokyo experienced a difficult period concerning the economic and energy market situation, the TMG ETS is not questioned by any serious political group within Tokyo (Interview I, II). Even if it sounds cynical, the system apparently got a major boost from the earthquake/tsunami/nuclear meltdown cascade of catastrophe Japan suffered in 2011. The Tokyo producers and consumers have learnt in a very drastic way that energy, even when nuclear power is given a strong priority, is neither an endless nor an endlessly cheap commodity. By the time of the immediate power outages caused by the catastrophe, as well as the ongoing power shortages due to the shut-down of all nuclear power plants, energy-saving measures had already been implemented due to the TMG ETS and its predecessor, the Carbon Reduction Reporting Program; these measures were highly valuable, saving not just costs, but in many cases the very ability to operate the facilities in the first place.

Given that energy is a limited resource in many cities around the world, it is highly likely that the Tokyo model will lead to similar systems in other cities. Tokyo already uses its ‘international relations’ (Niederhafner 2013: 387) to other cities to promote such local level ETS. Finally, it could also inspire modifications in systems that rely mainly and unsuccessfully on market-mode governance. The Tokyo ETS could therefore make an important contribution towards a global, multilevel, and effective GHG mitigation system as well—if the debate on global climate governance learns to widen its narrow focus on market-based governance towards systems of a more intelligent design.

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