



# Case 7: Tokyo

## Carbon Reduction Reporting for Small and Medium Entities

### Abstract

The Carbon Reduction Reporting for Small and Medium Entities (CRR) mandates the annual reporting of CO<sub>2</sub> emissions for existing small and medium-sized facilities (i.e. single building or group of buildings) in the Tokyo metropolitan. These facilities comprise some 60% of total CO<sub>2</sub> emissions in Tokyo's industrial and commercial sectors. In addition to the mandatory component, CRR has succeeded in attracting a large number of voluntary submissions from facilities keen to monitor annual emissions and compare to industry benchmarks.





Credit: Chao-Wei Juan / www.flickr.com

## 1. Programme context

### Citywide reduction target(s)

With 2000 as the base year, Tokyo Metropolitan Government (TMG) has fixed mid-term reduction targets for both GHG emissions and energy consumption. For GHG emissions, reduction targets are 30% by 2030. For energy consumption, the Environmental Master Plan (revised in March 2016) calls for a 38% reduction by 2030.

### Built environment context and programme background

Commercial and residential buildings in Tokyo accounted for more than 72% of metropolitan-wide energy-induced CO<sub>2</sub> emissions in 2013. In addition to many large buildings, approximately 660,000—or 10% of Japan’s small to medium commercial and industrial facilities—are concentrated in Tokyo. The majority of buildings were constructed during the so-called “Bubble Economy” period of the late 1980’s to the early 1990’s. This period saw much emphasis on lavish building design and little consideration on construction and running costs. Today, although many buildings erected in this era are in need of retrofitting to increase energy efficiency, such investments are lacking. In addition, following the Great East Japan Earthquake of 2011 and earlier seismic disasters across the nation, industry naturally attaches greater importance to buildings meeting seismic resistance codes than those with high energy efficiency. This said, it is estimated that some 30% of all small and medium buildings fall short of the most recent seismic resistance standards. Such buildings suffer from low market competitiveness, reducing the attractiveness of financial arguments to invest in energy efficiency upgrades. Additionally, building leases in Tokyo typically run in two-year cycles. Since tenants prioritise short-term rental costs, higher rental premiums—necessary to recover retrofitting investments for energy efficient buildings with low long-term running costs—have little appeal in the market place.

The Great East Japan Earthquake and Fukushima nuclear power plant disaster in 2011 have also significantly hampered efforts to reduce GHG emissions. This double calamity prompted the stopping of the entire national fleet of nuclear power plants for the past few years and switching of electricity generation to mainly gas and coal. Consequently, the carbon intensity of metropolitan electricity has spiked from 0.382 kg-CO<sub>2</sub>/kWh pre-disaster to 0.489 kg-CO<sub>2</sub>/kWh. Tokyo metropolitan is now in a unique and unfortunate position. Although a 17% reduction of energy consumption in the commercial and industrial sector was achieved from 2005 to 2013, the CO<sub>2</sub> reduction benefits have been mostly offset by this roughly 30% increase of carbon intensity in the electricity supply. Although this situation poses fundamental mid-term limitations to efforts to decrease GHG emissions in buildings, industry and policy making efforts to reduce CO<sub>2</sub> emissions are continuing regardless.

<sup>1</sup> TMG officials use this term to refer to either a single building or an industrial/commercial property with several buildings on the premises.



## 2. Programme overview

### Overall goals and start year

CRR was launched in 2010 with two core objectives. First, to bring the owners and tenants of small to medium, commercial or industrial facilities to monitor annual CO<sub>2</sub> emissions, and subsequently, take measures to reduce these. Secondly, to provide policy makers with data on the building stock, and provide this back to the owners and the market. These goals are pursued by mandating for facility owners the submission of an annual report outlining CO<sub>2</sub> emissions for the previous fiscal year and additional qualitative information such as implemented or planned emissions reduction measures. There is no common CO<sub>2</sub> emissions reduction target for the programme. Reporting entities are encouraged to fix individual emissions reductions targets. Reports are publically disclosed on the TMG website. CRR is a hybrid programme both a mandatory and voluntary component. Two types of reporting thereby occur: 1) facilities reporting as a regulatory obligation or 2) facilities reporting as a voluntarily measure to monitor CO<sub>2</sub> emissions and compare performance to peers.

### Programme target and scope

CRR specifically targets the owners and tenants of approximately 660,000 small and medium-sized facilities (including commercial, industrial and public) located in the Tokyo metropolitan. Targeted enterprises may comprise of single or multiple facilities. The threshold for mandatory reporting is set to facilities with an annual energy consumption in crude oil equivalent (COE) between 30 kL to 1,500 kL. For scale, a facility with annual energy consumption of 1,500 kL COE roughly corresponds to a typical office building with around 30,000 m<sup>2</sup> of Gross Floor Area (GFA). For businesses owning or operating multiple facilities in Tokyo, reporting is mandatory if combined annual energy consumption for the whole property portfolio is greater than or equal to 3,000kL. In this way, CRR is able to target the small, individual properties of large chain businesses. In financial year (FY) 2015 (reporting data for 2014) the total number of enterprises facing mandatory reporting requirements was approximately 291, representing approximately 23,023 individual facilities. Yet the number of enterprises reporting voluntarily dwarf this. Approximately 1,871 enterprises representing 11,476 individual facilities submitted reports in FY 2015.

Covered commercial, industrial and governmental facilities include convenience stores, owner occupied and tenant offices, supermarkets, restaurants, educational facilities, hotels, factories, entertainment venues and so on. Excluded facility types include vehicle, rail, shipping, air and other transportation related services, as well as residential buildings. Both owners and tenants are targeted by the programme. In the case of a leased facility, the owner would report for the entire property whilst the tenants would report for the leased area. In this way, two reports may be submitted from a single facility. Also, in the event where an enterprise possesses multiple facilities, the head office or representing section



Credit: © Tokyo Convention & Visitors Bureau

will report based on aggregated data for all facilities rather than individual properties. Incidentally, any individual facility with annual energy consumption above 1,500 kL COE faces mandatory GHG emission reduction responsibilities under the Tokyo cap-and-trade scheme. Therefore, such a case would nullify the need for compliance with CRR.

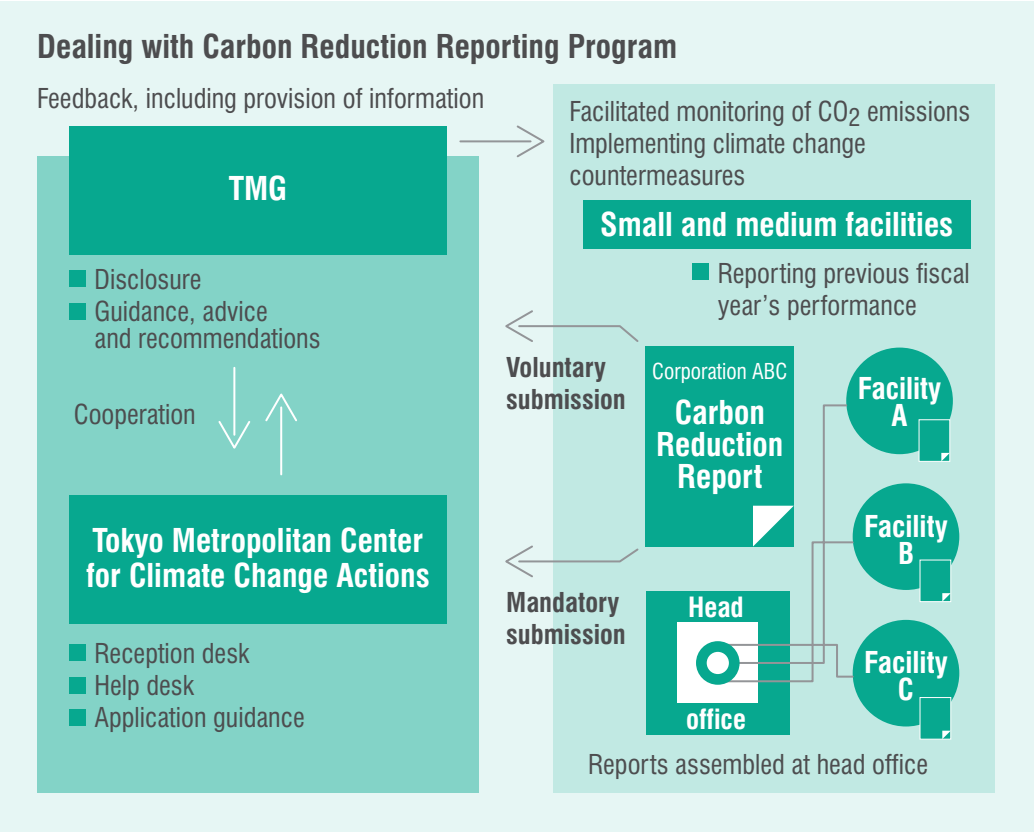
### Programme structure and function

The mandatory and voluntary carbon reporting process can be characterised by the following major steps and components, also summarised in Figure 1.

#### Report compilation and submission

Reporting for CRR covers the previous fiscal year. TMG provides an easy report making tool in Excel sheet format to facilities free of charge. A step by step guidebook explains how energy consumption data is collected and calculated (see *Data collection and utilisation*). Full reports may be prepared and submitted either in paper or electronic form to the Tokyo Metropolitan Center for Climate Change Actions (Cool Net Tokyo). This public corporation, funded entirely by TMG, was established to implement energy saving programmes on behalf of TMG.

Figure 1: Overview of the reporting process



Source: After Tokyo Green Building Report 2015.

- Reports provide TMG with an array of quantitative and qualitative data such as:
- Facility attributes (facility type, extent of ownership in the facility, GFA, reporting scope [i.e. whole building or tenanted area only])
  - Annual consumption amounts of electricity, gas, other fuels and water (including sewerage discharge) and CO<sub>2</sub>e amounts
  - CO<sub>2</sub> emissions for each energy consumption amount
  - CO<sub>2</sub> emissions intensity (total annual CO<sub>2</sub> emissions relative to GFA)
  - Overall organisational approach to promoting energy conservation and any CO<sub>2</sub> or energy reduction targets
  - Specific measures (planned and implemented) for promoting energy conservation and reducing CO<sub>2</sub> emissions

**Report verification**

Since CRR does not mandate specific CO<sub>2</sub> emission reductions, third party verification of data is not required. However to enhance the reporting scheme's credibility, TMG checks all submitted reports by comparing data with submissions for the previous year, and also contrasting results with those of similar type buildings. This contrasts with the cap-and-trade scheme, which requires third-party verification of data by agencies registered with TMG.

**Public disclosure**

Both mandatory and voluntary reports are publically disclosed on the official TMG website<sup>2</sup> in a searchable database format. Reports for individual enterprises can be located by anybody from the general public inputting a particular company name or address. Publically disclosed data includes total annual CO<sub>2</sub> emissions from energy use and water consumption, GFA, carbon intensity and qualitative information on energy consumption reduction measures. Raw energy consumption amounts are not publically disclosed.

**Site inspections for mandatory facilities**

The Tokyo Metropolitan Environmental Security Ordinance requires occasional site inspections for entities with mandatory reporting obligations. Each inspection lasts approximately two hours; the first hour for interviews and verification of energy bills, and the second for a site inspection of energy reduction measures reported, and identification of further opportunities to decrease energy use. Inspections are conducted by a specialist from Cool Net Tokyo and a TMG officer at the rate of approximately 90-100 each year. In this way, it requires approximately three years to visit all 300 mandatorily reporting enterprises. In general, site visits are positively recognised by relatively larger facility operators as an opportunity to deepen knowledge about unexploited onsite energy efficiency potential.

**Feedback and guidance**

As shown in Figure 1, CRR is characterised by a two-way exchange of information between reporting facilities and TMG. Data is collected through annual reports and then feedback provided through various forms. First, through a set of building-specific benchmarks, and second, through a carbon report card showing the "graded" carbon intensity relative to same type facilities (both elaborated in Data collection and utilisation). Industry specific handbooks outlining effective energy consumption reductions measures form a third feedback mechanism, and finally, annual training seminars are held each March, and attended by more than 300 industry stakeholders. These provide a general analysis of annual results for 30 business types and suggests various improvement strategies for each, also allowing frontrunner enterprises to share best practices with peers.

<sup>2</sup> <http://www8.kankyo.metro.tokyo.jp/ondanka/ad135gcce/index.php>





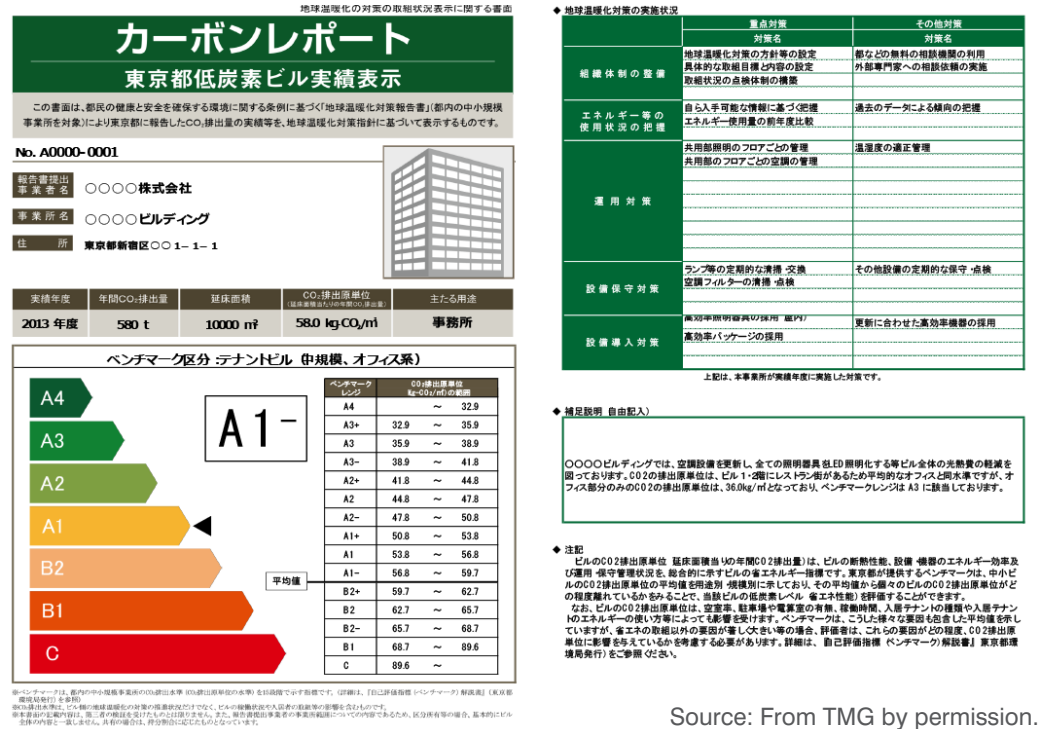
The core metric by which facilities monitor and report annual CO<sub>2</sub> emissions is carbon intensity (kg-CO<sub>2</sub>/m<sup>2</sup>). This reflects CO<sub>2</sub> emissions resulting from consumption of electricity, gas, other fuel use and water (including both consumption and discharge) relative to GFA over the reporting year. This data is collected via the above-mentioned Excel reporting tool. Since this calculates automatically the carbon intensity for each facility, it eliminates the need for technical knowledge in facility staff charged with reporting. Based upon energy invoices, reporting persons simply input annual energy consumption amounts for individual fuel sources in units such as kWh, Nm<sup>3</sup>, kg, L and so on. Each of these quantities are then converted automatically by Excel to caloric energy units (GJ/year) and then to CO<sub>2</sub> emissions. Lastly, the total CO<sub>2</sub> emissions are converted to COE (kL/year).

This initiative was integrated into CRR in 2012 after it was realised that merely reporting annual energy consumption and CO<sub>2</sub> emissions would not necessarily suffice to motivate facility owners and tenants to take actions to reduce energy

### Addition of Carbon Report Cards

In 2014, a Carbon Report Card initiative was added to CRR. This seeks to facilitate for prospective tenants the easy comparison of energy efficiency and CO<sub>2</sub> emissions intensity of multiple same-type buildings. The report card is individualised for each facility (see Figure 2 for the front and back image) and contains essentially two sets of information. The first is a quantitative comparison of that facility's CO<sub>2</sub> emissions performance relative to average industry benchmarks. This data is derived from the abovementioned Low Carbon Benchmarks and annual submissions of that facility. As seen on the left side of Figure 2, performance ranges for CO<sub>2</sub> emissions intensity extend from A down to C (with C broken down into a further 11 sub-levels). Mean performance (A1-) is set as the lowest sub-category in the A range. The second set of information is qualitative and appears on the rear of the card (right of Figure 2). This contains a summary of the ongoing or planned energy saving measures (both capital intensive and building usage related) for that facility.

Figure 2: Carbon Report Card front (left) and back (right).



Source: From TMG by permission.

Several expectations underpin this report card initiative. The first is that reporting facilities can more accurately determine individual performance relative to peer buildings than from benchmarking data alone, and then take measures to improve results and obtain a higher grade each year. In this way, report cards can facilitate a Plan-Do-Check-Act (PDCA) cycle, since annual improvements can be planned and measured each year. The second is that report cards could allow prospective tenants mindful of energy efficiency to easily compare performance across various buildings under rental consideration. They can also be used to estimate electricity running costs by converting carbon intensity to kWh/m<sup>2</sup> and then applying average utility electricity charges. Report cards can be displayed for the public in building spaces such as lobbies or shared directly with potential tenants by real estate agent representatives. The ultimate goal is that reports could serve as a building labelling scheme and drive a trend towards increased demand for low-carbon buildings.

Unique and innovative features

A unique defining feature of CRR is the explicit focus on CO<sub>2</sub> emissions. This contrasts to benchmarking schemes, which focus on energy consumption amounts. CRR’s focus on CO<sub>2</sub> emissions serves several purposes. First, public disclosure of CO<sub>2</sub> emissions data and not energy consumption amounts has enabled the scheme to attract many firms which would have been otherwise wary of publically disclosing raw energy consumption data (which can indicate intensity of internal business operations, which many industrial facilities prefer to keep confidential). Second, the focus on CO<sub>2</sub> emissions is a natural consequence of the manner in which the programme is framed and marketed. Although translated in English as a “Carbon Reduction Reporting Programme”, the Japanese name is “Global Warming Countermeasures Reporting Scheme”. Adoption of this term was driven by TMG desires to move beyond energy efficiency measures (which were already addressed by previous Japanese laws) towards fostering measures to tackle climate change by reducing CO<sub>2</sub> emissions. As such, CRR serves to mobilise industry support not only for reducing energy consumption (which directly benefit business operating expenditures) but also the wider goal of tackling climate change. Third, CRR complements the mandatory cap-and-trade scheme, which is also focused on CO<sub>2</sub> emission reductions. Whilst the cap-and-trade focuses on large facilities with an annual energy consumption above 1,500 kL of COE, CRR focuses on the numerous smaller properties of large chain enterprises falling outside coverage of the cap-and-trade. Individually the CO<sub>2</sub> emissions of each small facility might be relatively low and insignificant. Yet when seen as an aggregate portfolio for an individual enterprise, these emissions are often vast and comparable with large, single facilities targeted by the cap-and-trade.

Incentives and support mechanisms

CRR provides a variety of carefully designed incentive measures to both encourage voluntary participation in the programme and spur implementation of retrofitting measures to reduce energy consumption and CO<sub>2</sub> emissions:  
*Programme Participation Certificate*

A major incentive for voluntary participation—which makes up the bulk of reporting enterprises—is the prospect of improving PR to the public and shareholders. Public display of a Programme Participation Certificate (officially called “PR Sheet” in Japanese) can serve this end. This serves as official evidence of CRR participation and commitment to monitoring and reducing CO<sub>2</sub> emissions in the public interest. The certificate displays CO<sub>2</sub> emissions intensity for that year and previous years and GFA. It can be displayed alongside the above-described Carbon Report Card in a public space such as a building lobby or elevator.

Recognition of outstanding performance

Small and medium leased buildings that consistently report more than three years and beat average CO<sub>2</sub> intensity benchmarks may receive recognition as “Low Carbon Model Building”. These are featured on the TMG website<sup>3</sup>, which showcases information such as carbon intensity and performance relative to benchmarks, year-to-year emissions trajectories and notable emissions reductions taken. Any reporting tenant building is eligible to apply and must undergo an onsite verification by TMG officials.

Financial incentives

TMG has formulated an array of targeted subsidies and corporate tax credit schemes for small to medium entities. These incentivise and reduce the financial burden for facility owners implementing energy efficiency upgrades. Each has distinct objectives and eligibility requires participation and annual reporting in CRR. One subsidy package with a budget of ¥675 million aims to reduce CO<sub>2</sub> emissions in facilities by covering a portion of expenses accrued when shifting from in-house to an external and energy efficient cloud data storage. Another subsidy scheme under planning seeks to diffuse green lease practices. With a budget of ¥600 million, this will cover a portion of retrofitting costs for building owners on the condition that a green lease is concluded with a tenant. A third subsidy scheme aims to increase uptake of the Carbon Report Cards and render visible the impacts of retrofitting. With a budget of around ¥4 billion between FY2014-FY2015, qualifying facilities receive a maximum allocation of ¥20 million. This subsidises installation of LED lighting and motion/natural light sensors and high efficiency HVAC systems to obtain a higher grade (at least A2) on the Carbon Report Card. A final economic incentive offered by TMG involves a corporate tax credit scheme. This covers up to ¥20 million of purchase costs of specified low-carbon building equipment such as air conditioning, lighting, small boilers, and onsite renewable energy. On top of these, free energy audits are also provided to participants through Cool Net Tokyo. Beginning in 2008, each year approximately 300 facilities have undertake these audits, although some years have seen up to 700 facilitates participate.

<sup>2</sup> [https://www.kankyo.metro.tokyo.jp/climate/other/lowcarbon/model\\_b.html](https://www.kankyo.metro.tokyo.jp/climate/other/lowcarbon/model_b.html)





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### Links to other city policies or programmes

CRR functions as one of three core TMG programmes working to foster green buildings. The other two include the Tokyo Cap-and-Trade Programme, mandating CO<sub>2</sub> reductions in some 1,300 large facilities, and the Green Building Programme. The latter mandates integration of energy efficiency and green design principles in new construction over 5,000 m<sup>2</sup>. CRR does much to complement the cap-and-trade. First, it targets corporate chains comprised of numerous small to medium facilities scattered around Tokyo. Individually, each facility may fall under the minimum threshold marking mandatory participation in the cap-and-trade (1500kL COE per year). Yet if viewed as a portfolio, aggregate emissions can often exceed a single, large facility in the cap-and-trade. Second, sharing a common currency of CO<sub>2</sub> does much to assist reporting responsibilities for facilities moving from one programme to another. For example, since 2010, some 200 large facilities have reduced energy consumption to the point of being able to exit the cap-and-trade. CRR provides an important opportunity for such facilities to continue monitoring and reporting emissions. Third, large facilities in the cap-and-trade have the option of purchasing CO<sub>2</sub> emissions reduction credits from small and midsize facilities. One of the preconditions for small to medium facilities wishing to register and sell credits to larger cap-and-trade counterparts is annual reporting in the CRR.

## 3. Design and implementation

### Design phase

#### Timeline

CRR was launched in 2010. Yet ambitions to create a carbon reporting scheme for small to medium-sized facilities date back to the planning stages (around 1998) of the Tokyo Carbon Reduction Reporting Program for existing large facilities. Running from 2002-2005, this reporting scheme mandated reporting of CO<sub>2</sub> emissions to TMG for large facilities consuming more than 1,500kL of COE per year. This scheme was superseded by the mandatory cap-and-trade, also launched in 2010. Prior to the CRR launch date, in excess of one year was required for policy planning and revision of the Tokyo Metropolitan Environmental Security Ordinance to enable integration of coverage of small and medium sized facilities.

#### Inputs

Policy planning for CRR took place in tandem with the cap-and-trade. Within TMG, the initial approach was to first target larger facilities and then to later widen the scope to encompass small to medium counterparts. The bulk of planning was undertaken by a limited number of staff charged with CO<sub>2</sub> emissions and energy matters in facilities not covered by the cap-and-trade. As such, there was no such specific budget fixed for design of CRR.

### Implementation phase

#### Timeline

Implementation of CRR was made possible when the Tokyo Metropolitan Environmental Security Ordinance was revised in 2008. The programme itself came into force in 2010. The Low Carbon Benchmarks component was added in 2012 and the Carbon Report Card initiative in 2014.

#### Inputs

As of December 2015, six full-time staff from TMG are involved with implementation of CRR and related programmes such as free audits and financial incentives. Cool Net Tokyo, also assisting with implementation, holds a further 32 full-time staff. In addition to specific implementation of CRR (including verification of reports, data analysis, on-site visits etc.), these staff conduct marketing to promote carbon reduction measures in small and medium-sized facilities, provision of free energy audits, energy efficiency seminars and training, and various financial subsidy programmes.

Key collaborations

TMG has forged several partnerships and cooperative relationships with key industry groups to facilitate recruitment of reporting enterprises and programme implementation. These all serve as important drivers of the programme. In particular, the Tokyo Corporation Association (representing the interests of 140,000 corporations in Tokyo) has played a crucial role in CRR promotion. It has featured the programme in printed communications for members and requested TMG officials to conduct presentations at key meetings to outline CRR objectives and other policy strategies and support mechanisms for global warming countermeasures. It has also directly encouraged voluntary reporting from its various local chapters in the Tokyo metropolitan by awarding those attaining high submission rates for CRR with its own specially prepared budgets. The Tokyo Building Owners and Managers Associations has also played a key role. They have helped identify and contact frontrunner small and medium-sized-buildings to register for potential designation as a Low Carbon Model Building. This assistance was vital since registration for this requires tenants to share detailed data beyond reporting requirements of CRR.

TMG officials have also strategically reached out to corporate real estate agencies for cooperation in raising tenant awareness about CRR. One approach consists of jointly-held information seminars about CRR for tenants. Conducted twice during 2015, these attracted 170 participants, thus prompting plans to hold more in the future. Lastly, real estate industry representative groups, building owners, and on-the-ground technicians and experts have co-operated in forming a Small and Medium Tenant Building Low Carbon Partnership. This aims to spur market diffusion of the Carbon Report Cards.

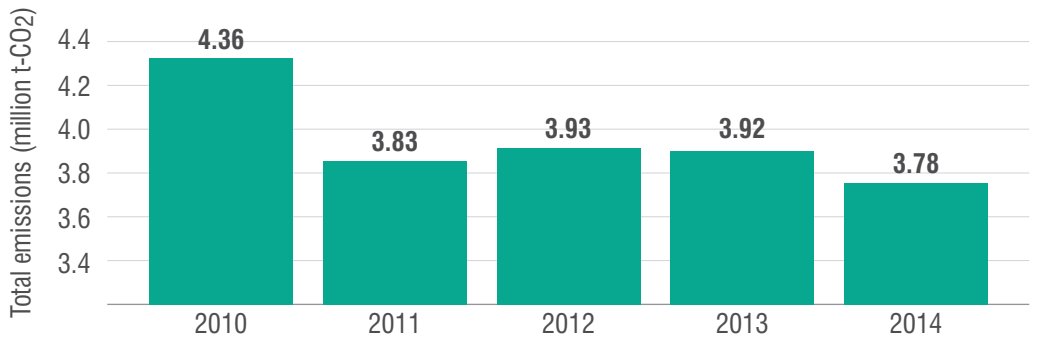
4. Outcomes and impacts

Environmental

As we show in Figure 3, the latest data from the 23,786 facilities submitting reports over five successive years since 2010 shows a declining trend for CO<sub>2</sub> emissions, with a 13.3% reduction achieved for the period 2010 to 2014 (shown as fiscal years). In reflection of this, CO<sub>2</sub> intensity in reporting facilities has also dropped—most saliently for office buildings. In owner-occupied offices, average CO<sub>2</sub> intensity dropped from 61 kg-CO<sub>2</sub>/m<sup>2</sup> in 2010 to 49 kg-CO<sub>2</sub>/m<sup>2</sup> in 2014 (a 20% reduction). Similarly, in tenant occupied office spaces, CO<sub>2</sub> intensity declined from 78 kg-CO<sub>2</sub>/m<sup>2</sup> in 2010 to 63 kg-CO<sub>2</sub>/m<sup>2</sup> in 2013 (19% reduction). Interestingly, emissions intensity improvements were not significant across all building types. They were notably lower in educational facilities such as schools and universities, together with hotels and entertainment venues. With approximately 93% of CO<sub>2</sub> emissions in reporting facilities attributable to electricity usage, these impressive reductions in overall emissions and sector-specific CO<sub>2</sub> intensity can be attributed to a significant decrease in electricity consumption. Of note, CO<sub>2</sub> emissions reductions observed over 2011-2013 can be largely attributed to rationing of electricity and extreme voluntary measures to reduce consumption in response to power shortages, caused by the closure of Fukushima. However the most significant achievement of CRR is that emissions have not rebounded even after power supplies to the Tokyo metropolitan were fully restored.

These CO<sub>2</sub> emission reductions hinge on using a fixed emissions factor of 0.382 kg-CO<sub>2</sub>/kWh for electricity, also used in the cap-and-trade. If taking into account the roughly 40% increase in carbon intensity of electricity following the post-Fukushima shift from nuclear to gas and coal, these impacts are nullified. Mirroring the second compliance period of the cap-and-trade, CRR's new CO<sub>2</sub> intensity factor for 2015-2019 will be 0.489 kg-CO<sub>2</sub>/kWh. The long-term impacts of CO<sub>2</sub> emissions in CRR reporting facilities therefore requires further monitoring over the coming years.

Figure 3: Total emissions (million t-CO<sub>2</sub>) for facilities reporting five fiscal years in a row.





Social impacts

A major social outcome concerns the impressive number of facilities that have been led to monitor and report carbon emissions on a voluntary basis. As shown in Table 1 and Table 2, voluntary reporters have grown from 1,217 enterprises in 2010 (representing 10,965 individual facilities) to 1,871 in 2015 (representing 11,476 individual facilities). Since programme launch, voluntary submissions have consistently outnumbered mandatory submissions approximately six-fold (although they represent only 4% of CRR’s total CO<sub>2</sub> emissions). Not overlooking attractive financial retrofitting subsidies from TMG that are linked to CRR, and the efforts of industry groups to recruit voluntary reporting facilities, rising voluntary submissions are driven by increasing industry appreciation for the many benefits of programme participation (see *Strengths and Drivers*).

Table 1: **Growth of mandatory and voluntary participating facilities\***

	2010	2011	2012	2013	2014	2015
Mandatory	20,326	22,567	21,896	22,348	22,415	23,023
Voluntary	10,965	11,439	12,114	11,180	11,914	11,476
Total	31,291	34,006	34,010	33,528	34,329	34,499

\*Data shows number of facilities (i.e. buildings) participating in CRR. Based on TMG data as of 12 February, 2016.

Table 2: **Growth of mandatory and voluntarily reporting enterprises\***

	2010	2011	2012	2013	2014	2015
Mandatory	273	306	315	287	291	291
Voluntary	1,217	1,313	1,532	1,706	1,969	1,871
Total	1,490	1,619	1,847	1,993	2,260	2,162

\*Data shows number of enterprises, which may consist of multiple facilities. Based on TMG data as of 12 February, 2016.

Information obtained from annually submitted reports also provides important data on non-capital intensive energy saving measures likely fostered by participation in CRR. For tenant occupied sections of office buildings, approximately 95% report taking measures such as extinguishing lights in vacant rooms or hours outside normal operation, 80% report turning off air-conditioning in vacant rooms or hours outside normal operation, and 45% report adjusting heating and cooling temperatures to less-energy intensive settings. Such measures were widely reported across most types of buildings.

Additionally, there are also expectations that the Carbon Report Cards, if shared with potential tenants, will boost market transparency and easy comparison of building energy performance, and serve as a type of green building label.

Market impacts

When compiling annual reports, in addition to abovementioned types of behavioural responses, facilities are able to report any retrofitting activity by selecting from a menu of different low-carbon technologies. Although the following outcomes are likely driven by wider market shifts towards installation of energy efficient technologies, participation in CRR appears to be playing a key role in driving retrofitting.

Results show that in particular, convenience stores and hospitals have attained a high and increasing rate of installation. For convenience stores (7,303 individual stores reported in 2015), installation of high performance lighting bulbs is growing; from an adoption rate of 20% in 2011 to approximately 90% in 2014. Also in 2014, other measures such as installation of air curtains in frozen/refrigerated sections had attained over 60% adoption rate, and approximately 45% for high-efficiency food display lighting and window-vicinity lighting control systems. Direct comparison with introduction rates in 2011 for these last three measures is not possible since menu options were updated in 2014. Nevertheless, compared to 2011, data from 2014 shows overall a significant growth from previously low adoption rates of energy saving technologies. For hospitals and medical clinics, the most widely adopted forms of low-carbon technology were high performance bulbs, lighting fixtures and HVAC equipment, each attaining around a 60% uptake rate in 2014. Another important CO<sub>2</sub> saving measure was installation of water saving equipment. This grew from around 15% of facilities in 2011 to approximately 50% in 2014. Similar to the convenience stores above, although direct comparison between 2011 and 2014 is not possible due to an update of menu items, 2014 data does suggest an increasing trend towards installation of energy saving equipment.

The combination of both non-capital intensive behavioural changes and installation of energy saving technologies has resulted in a highly significant reduction in electricity expenditures. From FY2010 to FY2014, an average electricity consumption reduction of 18.2% (from 1994 Mj/m<sup>2</sup> to 1646 Mj/m<sup>2</sup>) was achieved across reporting facilities. This translates to an annual savings in 2014 of ¥838/m<sup>2</sup>.

The combination of both non-capital intensive behavioural changes and installation of energy saving technologies has resulted in a highly significant reduction in electricity expenses. In hospitals and medical clinics for example, average annual electricity consumption dropped by 15.8%, from 204.2 kWh/m<sup>2</sup> in 2010 to 171.9 kWh/m<sup>2</sup> in 2014. If assuming ¥24/kWh, this translates to around ¥774/m<sup>2</sup> or ¥2.6 million in savings for each facility. In addition to other facility types such as retail stores, bars, restaurants, entertainment venues and so on, savings levels were also high in tenanted sections of office buildings (approximately 962 individual reporting facilities in 2014). Average annual electricity consumption dropped by 18.2%, from 192.5 kWh/m<sup>2</sup> in 2010 to 157.5 kWh/m<sup>2</sup> in 2014. If assuming ¥24/kWh, this equates to an approximate annual savings of ¥838/m<sup>2</sup> or ¥1.08 million per building.



## 5. Lessons learned for replication

### Strengths and drivers

#### *Measures to increase educational value of data*

CRR wields multiple strategies to increase the educational value of data collected through annual carbon reports and motivate enterprises to pursue improved energy efficiency. First, Low Carbon Benchmarks provide both building owners and current tenants with a snapshot of whether or not the particular facility is performing under or above industry averages for 30 building categories in Tokyo. Second, Carbon Report Cards aim to spur facility owners to improve annual benchmark performance and use report cards as green building labels to boost attractiveness to potential tenants. As a third educational strategy, TMG has collaborated with key industry stakeholders to produce a series of tailored energy efficiency handbooks aimed at facility supervisors and management in 27 specific business types. To mention a few, these include hospitals, convenience stores, fitness clubs and supermarkets. These provide an analysis of industry CO<sub>2</sub> emission trends (based on annually submitted reports) and a detailed breakdown of various operational and cost-effective retrofitting and energy reduction measures. These integrate both tacit knowledge gained from annual report submissions and intact knowledge gained from personal interactions between facility engineers and TMG officials.

Communication of clear benefits to encourage voluntary reporting  
Messages used in marketing the programme and associated benefits and incentives to industry have proved highly successful in securing voluntary reporters, eliminating the need for expensive advertising campaigns. Marketing messages concentrate on three core merits. The first is that participation in CRR allows industry to play a key and direct role in contributing to climate change mitigation efforts in Tokyo. This is important for corporations seeking to improve public image and tenant relations around climate change. The second is that reductions in CO<sub>2</sub> emission intensity ultimately lead to reduced running expenses, and the third is that annual reporting is simple and hassle-free. This third point is assured by the earlier mentioned Excel tool (see *Data collection and utilisation*).

#### *Measures to boost data reliability*

Although third-party verification of data is not required for reporting facilities, TMG takes various measures to boost data reliability. This is important since accuracy of reported data is crucial for maintaining continued industry support, particularly in voluntary reporters. Staff at Cool Net Tokyo (where reports are submitted) briefly check the energy consumption and CO<sub>2</sub> emissions amounts for year-to-year consistency. In cases where sudden changes in energy consumption are observed, reporting organisations are contacted. On top of this, before public disclosure, the entire quantitative and qualitative data (i.e.

measures to reduce energy consumption) in each report is verified. When errors are identified, reporting organisations are contacted and data problems rectified. TMG staff communicating with enterprises about incorrect data entries identified after submission are careful to maintain a highly supportive attitude and ensure smooth and productive communication through easy to understand explanations. This is seen as a crucial strategy in motivating enterprises reporting on a voluntary basis to take the trouble to verify and then resubmit flagged data.

#### *Simplified reporting and conscientious guidance*

Another two points may contribute to the increased number of the voluntary reporting. The first one is the easy to understand simple reporting system, as the covered entities include small shop owners. Free drafting excel sheet for the Carbon Reduction Reporting Programme is provided to reduce the difficulties for the voluntary submission. The simple inputs of annual electricity, gas, fuels and water consumption in the excel sheet can be easily converted to CO<sub>2</sub> emissions.

### Challenges, limitations and countermeasures

#### *Acquisition of tenant data*

Similar to benchmarking programmes, building owners in CRR often face difficulties in acquiring tenant energy consumption data. Since these challenges were anticipated, two countermeasures were conceived. The first was the decision to publically disclose only CO<sub>2</sub> emissions intensity data and not raw energy consumption amounts. This helps overcome concerns of tenants not wishing to disclose energy consumption. The second measure was to allow building owners to estimate energy consumption in tenant spaces where difficulties in data gathering are experienced. This strategy has not posed any significant challenges to maintaining the accuracy of overall programme data—principally for two reasons. Firstly, the number of cases where owners are forced to estimate tenant data consumption are relatively rare. Secondly, and perhaps more importantly, the generation of CO<sub>2</sub> emissions data does not constitute the primary objective of CRR. Rather, the main programme goal lies in prompting a shift in industry awareness around energy consumption through the act of reporting itself. This occurs as various building stakeholders cooperate to collect data, monitor emissions and consider improvement measures.

#### *Reporting and disclosure of energy consumption data*

TMG officials have so far been unable to achieve a disclosure of raw energy consumption data due to industry resistance. There are principally two reasons why disclosing energy data is important. Firstly, energy consumption amounts are a direct indicator of energy use and can thus more easily show the results of retrofitting and operational measures to reduce energy consumption. Secondly, since the Fukushima nuclear disaster, the CO<sub>2</sub> intensity of the Tokyo power supply has risen by approximately 40% following a switch in fuel from nuclear to natural gas and coal. In this light, public disclosure of energy consumption



quantities would deliver a more positive and meaningful message to the public and programme participants than CO<sub>2</sub> emissions. Mutual disclosure of both energy and CO<sub>2</sub> emissions data therefore constitutes an important area for CRR to tackle over the next few years.

**Market demand for low carbon buildings**

Officials are experiencing difficulties in simulating market demand for low-carbon buildings through the various tools developed for CRR. As already explained, strategies taken to boost the educational value of CRR data and increase tenant recognition and demand for energy efficient buildings include Programme Participation Certificates, Low Carbon Benchmarks, and Carbon Report Cards. Yet results of a survey administered in 2015 to 1,149 small and medium sized organisations revealed extremely low awareness and utilisation of these initiatives. For example, only 14% of respondents had heard of the Programme Participation Certificate, and of these, only 30% reported currently displaying it. Industry awareness of the Low Carbon Benchmarks and Carbon Report Cards is similarly low, at just over 10% for each. Of these respondents, only 40% indicated using the benchmarks, and 25% for the Carbon Report Cards. The most common reason cited was uncertainty as to how these tools could be effectively used. Several countermeasures have been formulated in response. For example, the already mentioned retrofitting subsidy for incentivising improved energy efficiency based on report card performance (see *Financial incentives*) is expected to play an important role in increasing report card usage. The Small and Medium Tenant Building Low Carbon Partnership consisting of a collaboration with key industry stakeholders—also formed to spur wider market diffusion—is equally anticipated to mitigate this challenge.

**Tenant engagement**

Officials are encountering challenges in engaging corporate tenants with energy efficiency issues. Tenant demand in Japan for earthquake resistant buildings tends to overshadow that for energy efficiency. Also, frequent turnover of tenant leases reduces the ability of owners to raise rents to cover building upgrades. This problem surfaces particularly during free energy audits; many recommendations are not implemented due to split-incentives between owners and tenants. The absence of any industry group in Tokyo specifically representing tenant interests also hampers tenant outreach efforts. To overcome this, as mentioned TMG officials have recently collaborated with corporate real estate agencies to conduct tenant seminars on CRR participation, key results, and effective energy efficiency measures. In addition, TMG has started to promote green leases through, for example, earlier mentioned retrofitting subsidies that require sharing of costs and benefits through lease modifications.

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