

TOKYO GREEN BUILDING REPORT 2015



Introduction

In the year 2000, the Tokyo Metropolitan Government (TMG) replaced the Tokyo Metropolitan Pollution Prevention Ordinance with the Tokyo Metropolitan Environmental Security Ordinance, which covers countermeasures for vehicle pollution, chemical substances and climate change. The reason for the replacement was a shift in Tokyo's environmental problems from industrial pollution mainly attributable to factories to urban and domestic pollution due to vehicle emissions and chemical substances, which may sometimes be related to climate change problems.

In 2002, we started two programmes on which Tokyo's present climate change strategy has been based: Tokyo Green Building Program for new buildings and Tokyo Carbon Reduction Reporting Program for existing large facilities. Since 2005, we have been promoting environmentally superior developments by introducing a mechanism to evaluate and disclose facilities' efforts made in the programmes.

In Tokyo's Big Change - The 10-Year Plan developed in 2006, we set a goal of reducing citywide greenhouse gas emissions by 25% below 2000 levels by 2020 to make Tokyo a city with the least environmental impact in the world. Then in 2007, we announced the Tokyo Climate Change Strategy, which clarified our basic attitude toward tackling climate change for the next 10 years. Following a revision of the Tokyo Metropolitan Environmental Security Ordinance in 2008, we launched the Tokyo Cap-and-Trade Program for large facilities, the world's first urban cap-and-trade scheme that covers office buildings as well, and the Carbon Reduction Reporting Program for small and medium facilities, committed to advancing our climate change strategy ever since then. We were able to overcome the power crisis brought about by the Great East Japan Earthquake in March 2011 through emergency power saving, leveraging our experience from the climate change strategy, enabling smart and continuous electricity saving and energy efficiency to be rooted in homes and businesses in Tokyo.

This report is designed to introduce the framework and accomplishments of the Green Building Policy promoted by Tokyo as a huge energy consumer, focusing on the Tokyo Cap-and-Trade Program, which has achieved tangible CO₂ reductions in the city since its commencement.



As a massive energy consumer, the Tokyo Metropolitan Government has taken pioneering measures for climate change mitigation and energy saving. Fine-tuned to the characteristics of megacities dense with various types of buildings, including offices, our efforts represented by the Tokyo Cap-and-Trade Program have produced concrete results, owing to support from many businesses, homes, and NGOs in Tokyo.

Key to climate change countermeasures in future: Megacities

The more frequent extreme weather resulting from climate change has become one of the most serious environmental problems. The Fifth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) says that climate change is beyond question, and human activities are very likely to be a dominating factor for the rise in the world's average temperature continuing since the mid-20th century.

To avoid a climate change crisis, it is imperative to reduce emissions of greenhouse gases, including CO₂. In particular, city-led measures will become more important as 67% of the world's energy is consumed in cities and 71% of energy-induced CO₂ is emitted from cities.

Commercial and domestic sectors responsible for 70% of total CO₂ emissions in Tokyo

Tokyo's energy-induced CO₂ emissions in FY2012 amounted to 64.3 million tonnes, equivalent to those

of some whole countries, such as Austria.

The commercial and domestic sectors constitute a large share of CO₂ emissions in Tokyo, where offices and other buildings are concentrated, while the industrial sector, including factories, accounts for a high proportion of CO₂ emissions across Japan.

In pursuit of reducing energy consumption and GHG emissions

In Tokyo's Big Change - The 10-Year Plan developed in December 2006, the Tokyo Metropolitan Government set a goal of reducing citywide greenhouse gas emissions by 25% below 2000 levels by 2020. To achieve this goal, we have enacted and implemented a series of policies, such as the Tokyo Cap-and-Trade Program.

CO₂ emissions originating from electricity supplied to Tokyo are increasing in spite of reduced energy consumption since the Great East Japan Earthquake. To clarify the targets that energy consumers should pursue in the context of the 25%

reduction goal, we set another goal of reducing Tokyo's energy consumption by 20% below 2000 levels by 2020 in March 2014, concentrating on the energy consumption itself.

In December 2014, we set a new goal of reducing Tokyo's energy consumption by 30% below 2000 levels by 2030 in order to continue and increase the energy saving efforts into 2020 and beyond.

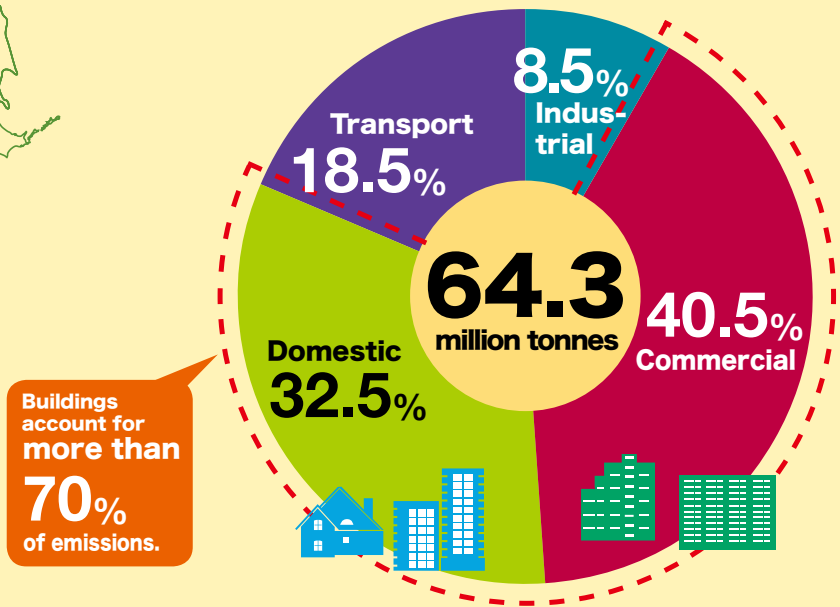
16% reduction achieved in FY2012 with help from people and businesses in Tokyo

Tokyo's energy consumption was reduced by 9.8% below 2000 levels in FY2010, 15% in FY2011 as a result of power saving after the Great East Japan Earthquake, and 16% in FY2012.

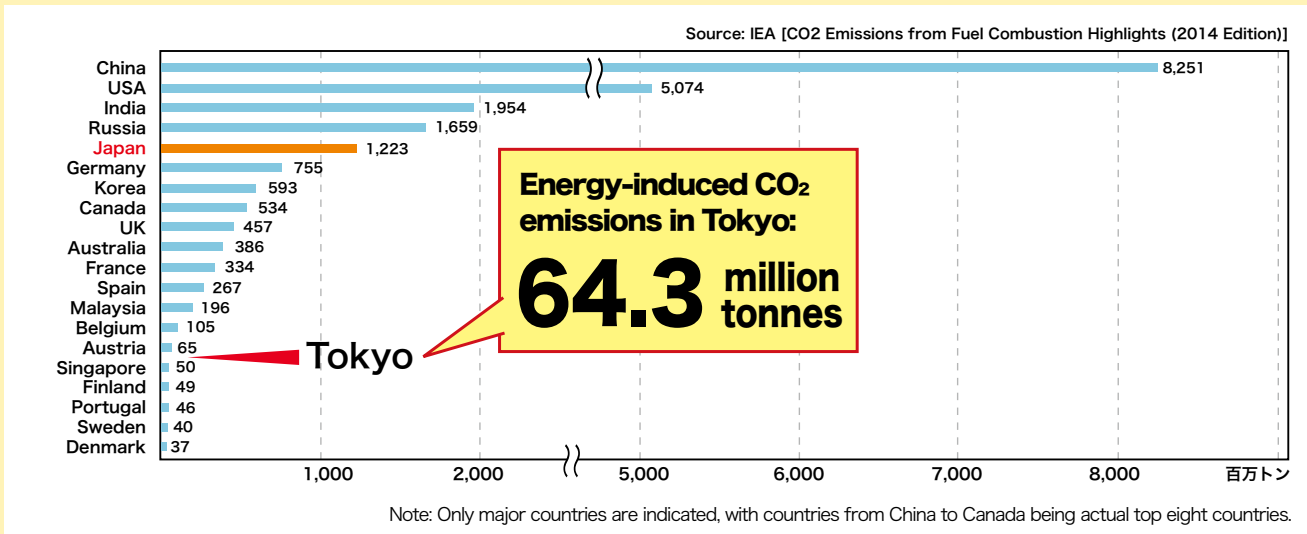
The Tokyo Metropolitan Government was able to overcome the power crisis following the earthquake and has been successful in maintaining the downward trend in energy consumption in the city despite seeing economic growth.



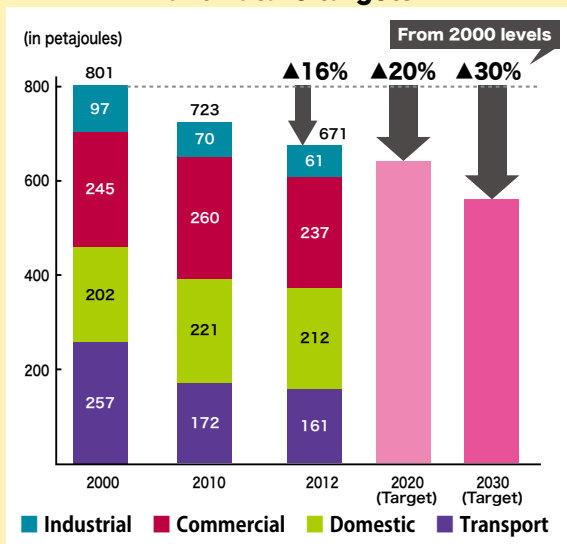
Sectoral breakdown of energy-induced CO₂ emissions in Tokyo in FY2012



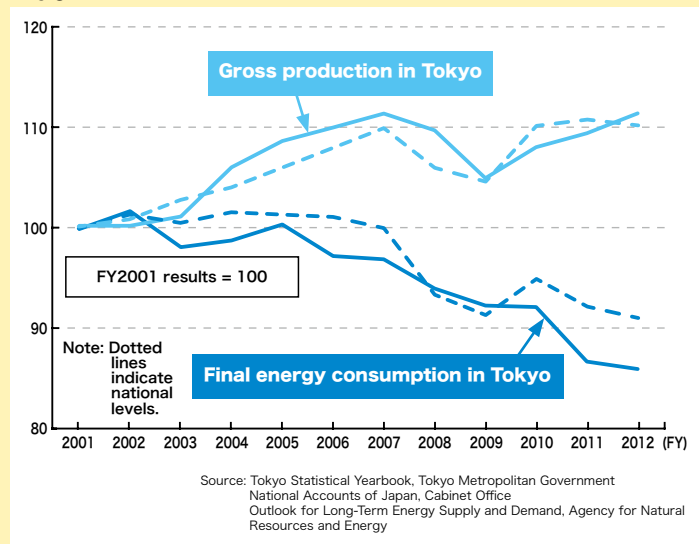
Energy-induced CO₂ emissions by country in FY2012



Transition of energy consumption in Tokyo and future targets



Transition of energy consumption and economic index



Mechanism for dramatic CO₂ reductions in buildings

Tokyo's Three Programmes Promoting Green Buildings

Critical challenges for Tokyo include energy efficiency in buildings, including offices and condominiums. The Tokyo Metropolitan Government is striving to make itself a low-carbon city by developing effective policies according to building type (new or existing) and size (large or small/medium).

Introducing the world's first urban cap-and-trade scheme for large facilities^{*1}

In April 2010, the Tokyo Metropolitan Government started requiring large facilities to reduce CO₂ emissions through the Tokyo Cap-and-Trade Program. This programme is not only the first cap-and-trade scheme in Japan but also the world's first urban cap-and-trade scheme that covers the commercial sector as well, including office buildings, which are often concentrated in megacities.

Reporting programme developed to support small and medium facilities^{*2}

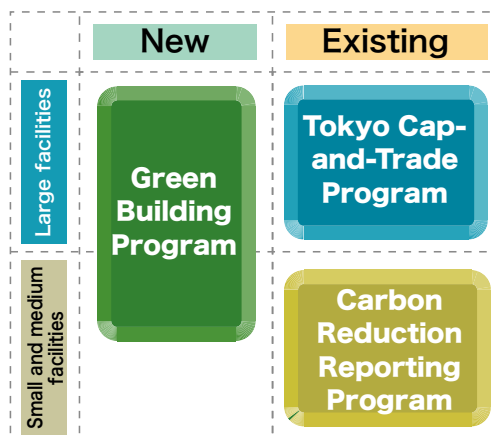
For approximately 630,000 small and medium facilities in Tokyo, we launched the Carbon Reduction Reporting Program in April 2010.

Based on submitted data, CO₂ emissions levels are analysed for each business type and a self-rated index (low carbon benchmark) is disclosed. We are also enhancing support for small and medium facilities by starting the Carbon Report programme targeting small to medium sized leased buildings.

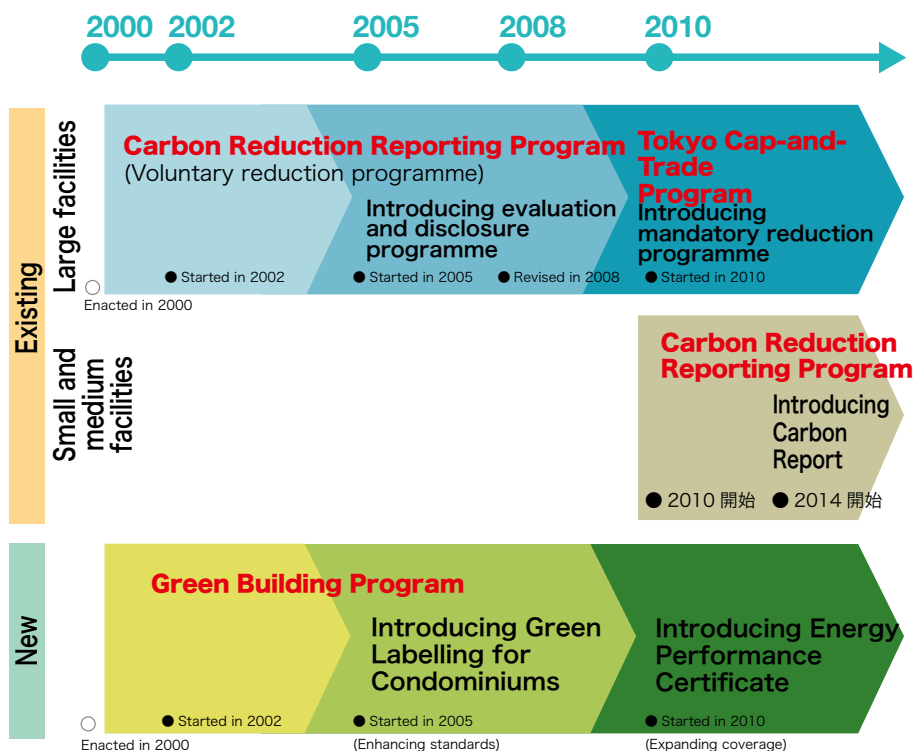
Green Building Plan for new buildings to encourage eco-city development

Upon construction or extension of buildings larger than a certain size, we request building owners to submit a Green Building Plan, which shows different aspects of buildings' environmental consciousness, driving eco-friendly developments and evolution of environmental technologies.

Framework of Tokyo Green Building Policy



Green Building Policy Enhancements



*1 Facilities whose annual energy consumption is greater than or equal to 1,500 kL of crude oil equivalent

*2 Facilities whose annual energy consumption is less than 1,500 kL of crude oil equivalent

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Large facilities

Small and medium facilities

New buildings

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Contribution to global CO₂ reductions through inter-city cooperation and international networks

Globally-acclaimed Tokyo Cap-and-Trade Program

Climate change has become a serious environmental problem throughout the world. Because of its focus on measures for the urban building sector, which has a high potential for greenhouse gas emissions reductions, Tokyo's climate change strategy is attracting the world's attention, with its results highly evaluated.

Attracting attention at the time of programme launch

Having applied the cap-and-trade programme to the building sector (with a large share of CO₂ emissions), the Tokyo Metropolitan Government's climate change strategy attracted the attention of city officials and researchers around the world soon after the programme was launched and before the first-year report yet had been submitted.

This resulted from high acclaim for our innovative programme design and our approaches to ensuring the programme's efficacy through integrating collaboration between building owners and tenants into the programme itself.

During the introduction and implementation processes of the programme, we held a series of deliberate meetings with many stakeholders, including building owners, managers and experts, achieving tangible results that influenced the direction of the programme. We were also invited to many international conferences, interviewed by the media and featured in research reports and magazines.

Government Leadership Awards

In December 2011, winners of the Government Leadership Awards were announced at the COP17 press conference held in Durban, South Africa. The awards were hosted by the World Green Building Council (WGBC)



Sponsored by C40 Cities Climate Leadership Group and Siemens, the City Climate Leadership Award ceremony held in London, September 2013

and cosponsored by the UN Human Settlements Programme (UN-HABITAT) and ICLEI - Local Governments for Sustainability. The Tokyo Cap-and-Trade Program was selected as the 'Most Groundbreaking Policy' even though it had not been long implemented.

C40 Cities Climate Leadership Group and City Climate Leadership Award

The Tokyo Metropolitan Government won the C40's City Climate Leadership Award in September 2013. Receiving a great evaluation on its mechanism for collaboration with building owners and

tenants for improved energy efficiency, our urban cap-and-trade scheme was applauded as "an excellent model" that is convincing to other cities.

The C40 Cities Climate Leadership Group was established as a network intended to bolster collaborative efforts of megacities around the world against climate change. We joined the group in 2006 and have been acting as a member of the steering committee and a network leader to aggressively lead its activities.

Tokyo Cap-and-Trade Program winning international reputation



米国における建築物とエネルギーに関するフォーラム
(2013年3月、ヒューストン)

With more than half of the world's population living in cities, CO₂ emissions from cities account for more than 70% of total emissions throughout the world. This is why we should put emphasis on effective measures for buildings, which account for a significant share of CO₂ emissions. The Tokyo Cap-and-Trade Program has been highly-regarded for its role in the drastic reduction of energy consumption in existing city buildings.

Many academics and experts say that the catalyst to reducing CO₂ emissions around the world is pricing CO₂ emissions and influencing the market. Our efforts made through the Tokyo Cap-and-Trade Program are recognized as a big step toward the future because the programme includes emissions trading as an integral part.

Working with ICLEI to promote city-led approaches

City-level climate change strategies have become increasingly important in the international arena. Tokyo shares experiences and best practices with other cities by working with ICLEI, in which more than 1,000 local governments from 85 countries and regions are acting to solve environmental issues in cities. In addition, we have built an international coalition of local governments to communicate the importance of city- and municipality-level climate change strategies to the United Nations and other stakeholders.



UNFCCC technology professional meeting
(Bonn, June 2014)

Announcement and contribution



Joint report by C40 and TMG
(November 2014)

November 2014

C40 and TMG issued a joint report titled "Urban Efficiency: A Global Survey of Building Energy Efficiency Policies in Cities." The report features best practices in climate change strategies promoted by megacities around the world as well as the Tokyo Cap-and-Trade Program.

URL: http://www.kankyo.metro.tokyo.jp/en/int/c40/c40_pse_r.html



Collaborative forum by C40 and TMG (Tokyo, June 2014)

September 2014

Governor of Tokyo, Yoichi Masuzoe, participated in the "Putting a Price on Carbon" campaign hosted by the World Bank, making public video messages with US President Obama and German Chancellor Merkel.

June 2014

The Tokyo Forum on Building Energy Efficiency and associated workshop were held to share information with officials from megacities worldwide and discuss collaboration in the fight against climate change.



C40 and TMG workshop
(Tokyo, June 2014)

June 2014

At the United Nations Framework Convention on Climate Change (UNFCCC) conference held in Bonn, the Cap-and-Trade Program was introduced as a globally significant effort and its achievements were announced.

January 2014

The programme was featured as a case study in the International Carbon Action Partnership (ICAP)'s "Emissions Trading Worldwide: ICAP Status Report 2014."



Government Leadership Awards ceremony (Durban, December 2011)

September 2013

The programme was presented as a case study in "The World's Carbon Markets" report by the International Emissions Trading Association (IETA).

June 2012

National Geographic's official website featured the programme's first year accomplishments as "Spotlight on Tokyo: World's first urban cap-and-trade program yields promising first-year results."



World Bank report
(June 2010)

December 2010

The World Bank's "Cities and Climate Change: an Urgent Agenda" report introduced the programme.

June 2010

The programme was presented as a case study in the "Direction In Urban Development" report by the World Bank, under the headline: Tokyo's Emissions Trading System: A Case Study.

Creating an admirable low-carbon city

Buildings in Climate Change Strategies

As a pioneering energy efficiency measure tailored to the city, the Tokyo Cap-and-Trade Program relies on the combined efforts of facilities and Tokyo itself, supported by the sincere and honest character of its citizens. This is an interview with an expert about the reasons why Tokyo is attractive as well as Tokyo's way of tackling environmental issues as a huge consumer society in the 21st century.

Shinichi Tanabe, Professor, Waseda University

We tend to think industries and vehicles are responsible for a large share of energy consumption. Actually, both at home and abroad, residential properties and other buildings account for about one third of total energy consumption, having a serious influence on the global environment. Worldwide, their energy consumption will reach twice or even triple the current amount by 2050 due to an increase in total floor area of buildings and improved standards of living. Consequently, we definitely need to think about energy consumption in the housing and building sectors.

More and more people have concentrated in cities around the world. The number of highly-populated cities like Tokyo is increasing and Tokyo can set a good example for such cities. In particular, a huge increase in energy consumption is expected in hot and humid areas, including Southeast Asia, and measures needed in such regions are challenging. Japanese technologies will prove to be very effective when we consider building in areas such as these.

What has Tokyo Cap-and-Trade brought in?

There are different forms of cap-and-trade, and some people think of economic transactions first. However, the Tokyo Metropolitan Government is very serious and earnest in achieving super energy efficiency and super low carbon. They are sincerely committed to ensuring a framework that enables a good business environment with

care for environmental load.

Among 630,000 facilities in Tokyo, approximately 1,300 are large facilities under the Tokyo Cap-and-Trade Program. Some of these large facilities are developing very ecologically-aware approaches and have become exemplary models for other facilities. TMG's programme does not require the same emissions reductions from all large facilities but takes early action into consideration.

We can say their certification of excellent facilities as top-level serves to guide corporate activities in the right direction. The certification not only relaxes the compliance factor or reduction rate but is also a great honour for facilities. Recently, there is a favourable movement in the building industry-new buildings are designed to satisfy the requirements for top-level facility certification.

The programme and building management

I think we can see the industriousness and careful operation specific to Japanese people by the fact that even buildings already certified as top-level still work on further reductions. However, some facilities go too far in energy saving. "Save energy with mental strength" is a typical Japanese way of thinking. But it does not make any sense if it slows down productivity and does not lead to tangible reductions in energy consumption. Some top-level facilities have become a model by identifying what is most important and achieving energy



Shinichi Tanabe
Professor, Faculty of Science and Engineering, Waseda University
Specializing in Architectural Environmental Engineering. Graduated in 1980 from the Department of Architecture, Faculty of Science and Engineering, Waseda University. Present post after acting as a visiting researcher at: Energy Laboratory at Technical University of Denmark; Lawrence Berkeley National Laboratory; and Environmental Planning Laboratory at University of California, Berkeley.

efficiency without losing comfort.

The next goal will be to apply suitable energy saving measures to a lot of small and medium buildings constructed during the so-called bubble economy and improve the value of these buildings.

Tokyo as a city full of attractiveness

Japan is not rich in energy resources. Japan has to navigate the global business environment through the exportation of manufactured goods, while at the same time generating a large trade deficit. This tells us how important it is to use energy efficiently. A future challenge for cities will be to manage energy use rather than merely saving energy.

Tokyo is a very attractive city by nature because it is safe and prices are somewhat reasonable. Even the haphazard arrangement of buildings, differing from the orderly arranged streets in Europe, is recognized as one element of Tokyo's attractiveness. Leading the world in terms of the environment and energy efficiency, Tokyo is a marvellous city after all.

Tokyo Cap-and-Trade Program

Significant reductions for four consecutive years since commencement

In FY2013:

23% Reduction in CO₂ Emissions

CO₂ emissions at covered facilities were reduced by 13% in FY2010 and 22% in FY2011 due to further power saving measures taken after the Great East Japan Earthquake. The same 22% reduction was achieved in FY2012, followed by record reductions of 23% in FY2013, approximately four times the reduction target of 6% in the first compliance period.

- Reductions in FY2011, or more specifically, those immediately after the earthquake in March 2011, have been continued.
- Reductions over the previous fiscal year's performance were achieved at approximately 60% of facilities.

A 23% reduction realized in spite of a 3% increase in floor area

In FY2013, many covered facilities maintained the reduction levels seen in FY2011 immediately after the earthquake, with approximately 60% of facilities achieving reductions exceeding the previous fiscal year's performance.

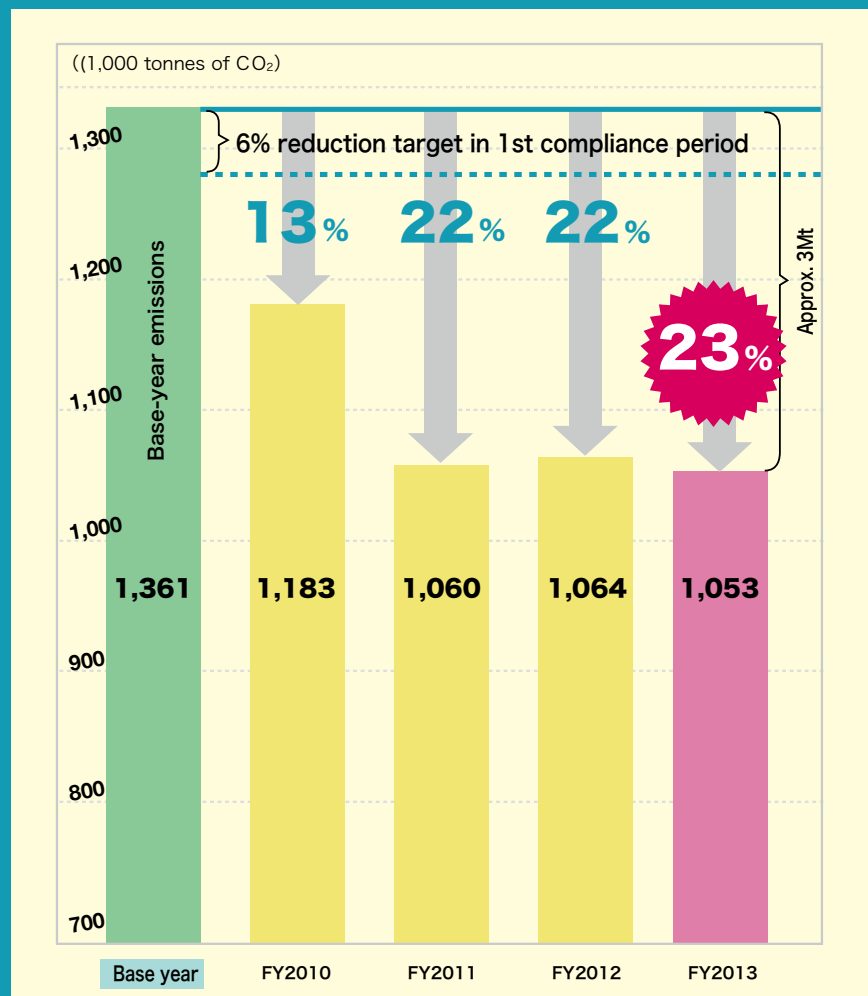
Measures taken as part of electricity saving carried out following the earthquake in FY2011, such as reduced illuminance or reductions in outside air inflow, have been continued while other efforts, including setting summer air-conditioning temperatures at 28°C in the office, are being phased out.

FY2013 saw further reductions of 1% over the previous fiscal year as facilities took additional energy efficiency measures, such as a shift to LED illumination, introduction of energy efficient air conditioning equipment, and improved energy management of pumps. CO₂ reductions of 23% were achieved even though floor area increased by 3% from the base year.

Equivalent to annual CO₂ emissions from 1.35 million households

The 23% reduction at covered facilities equates to approximately 3 million tonnes of CO₂, which corresponds to the annual CO₂ emissions from 1.35 million average households in Tokyo.

Transition of covered facilities' total CO₂ emissions



Reductions doubling the national levels, 90% of facilities outperforming the compliance factor

Ensuring Tangible Effects since Commencement

Since its start, the Tokyo Cap-and-Trade Program has produced remarkable results. The programme has changed owners' awareness of energy efficiency measures at more than 70% of covered facilities, achieving its original goal of turning energy efficiency measures in the field into a challenge for corporate management.

Significant CO₂ emissions reductions doubling the national levels

CO₂ reductions at facilities under the Tokyo Cap-and-Trade Program double the national levels, proving the programme's tangible effects.

Further reductions are expected as new measures are planned for the next fiscal year and beyond.

90% of facilities outperforming the compliance factor

Comparison of actual reductions with compliance factors at facilities as of FY2013 shows that around 90% of facilities have outperformed the compliance factor in the first compliance period and around 70% have outperformed the compliance factor in the second compliance period as well. This seems to have resulted from their aggressive promotion of energy efficiency measures, strong will to achieve the emissions reduction targets and strengthened awareness of power saving after the earthquake.

Facility owners becoming more interested in CO₂ reductions

A questionnaire to facilities in 2014 indicates that over 70% of facility owners have become more interested in CO₂ reductions and 10% answered that owners have become much more interested. This again demonstrates one of the programme's original goals: Turning energy efficiency measures in

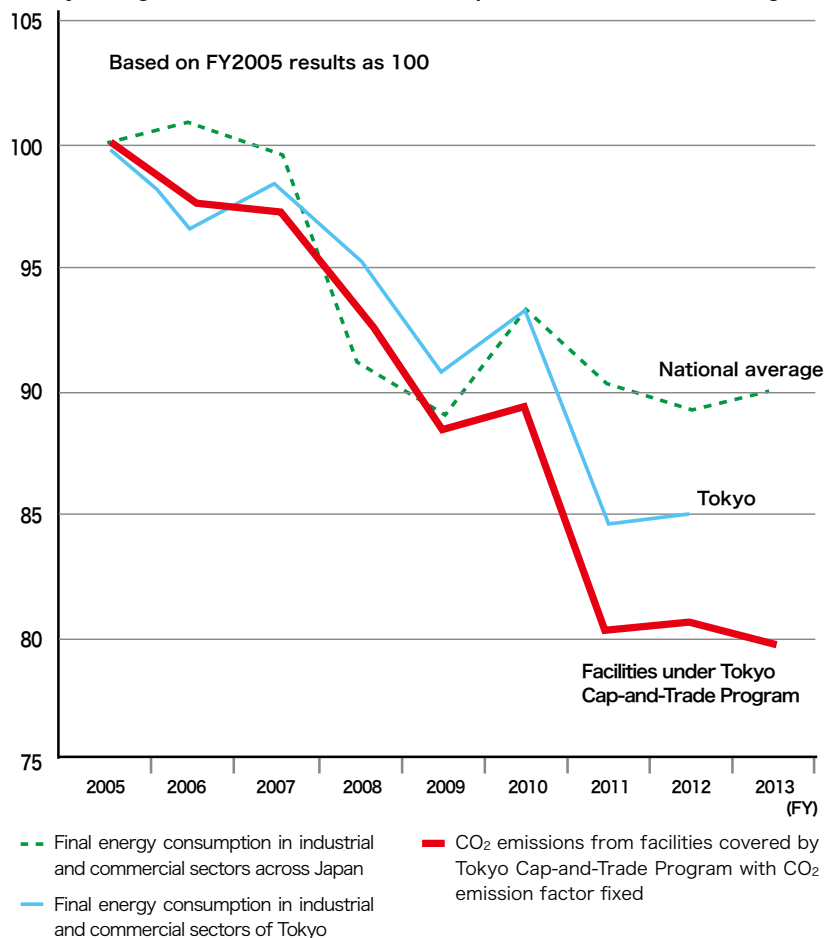
the field into a challenge for corporate management.

Encouraged selection of energy efficient equipment

The programme has changed the mindset of facility owners and caused them to select more energy efficient equipment upon facility renovation.

Questionnaire results show that more than 70% of covered facilities have become more aggressive in incorporating such equipment when replaced, implying that energy efficiency measures are implemented from a medium- to long-term perspective.

Yearly changes in CO₂ emissions, etc. (comparison with national average)



CO₂ emissions reductions

in spite of the energy crisis following the Great East Japan Earthquake

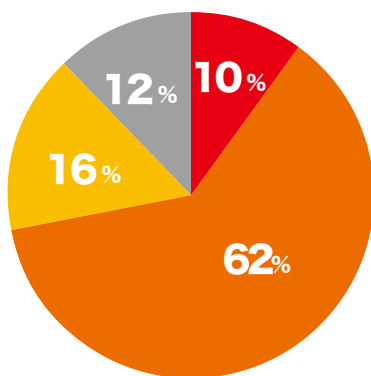
“Half carbon buildings” emerged with CO₂ emissions intensity less than half that of the base year

Compared with the base year, CO₂ emissions intensity per office building floor area was reduced by 16% in FY2010 and 27% in FY2012, demonstrating the effects of energy saving measures.

The programme defines and makes public “emission intensity standards” values for each purpose of use. The emission intensity standards for office buildings are 85 kg-CO₂/m². The ratio of facilities below the value was around 15% in the base year and increased to around 50% in FY2012. The emission intensity standards have now virtually become the de-facto standard for office buildings.

Focusing back on CO₂ emissions intensity, some office buildings achieved 50 kg-CO₂/m² or less, less than half the average of the base year, which was approximately 103 kg-CO₂/m².

The programme made owners of over 70% of facilities more interested in energy efficiency measures.



Q.Has your owner become more interested in the transition of CO₂ reductions?

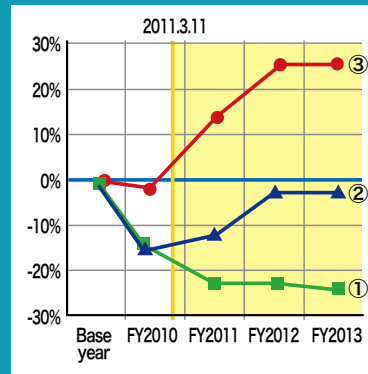
- “Significantly” made up 10%.
- “Yes” made up 62%.
- “Has been very interested” made up 16%.
- “No” made up 12%.

Source: Questionnaire on Tokyo Cap- and-Trade Program (in Japanese) in 2014



Rolling blackouts in Tokyo after the earthquake
Electronics retail store open at night with reduced illuminance for power saving
(Shinjuku, Tokyo; March 15, 2011)
Photo provided by Kyodo News

Influence of nuclear power station closure on 23% reduction



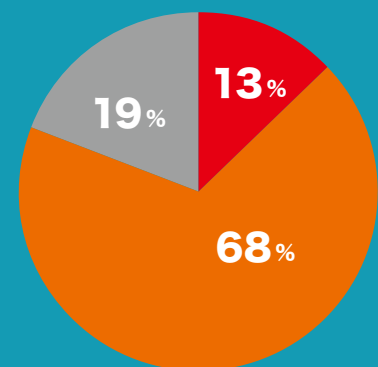
CO₂ emissions after earthquake

- CO₂ emissions under C&T with factor fixed
- ▲ CO₂ emissions under C&T with factor varied
- CO₂ emissions without energy saving with factor varied

3% reduction achieved even with greater CO₂ emission factor applied

In the Tokyo Cap-and-Trade Program, CO₂ emissions reductions thanks to energy saving at facilities are evaluated by fixing the CO₂ emission factor (CO₂ emissions generated when 1 kWh of electricity is used) during the compliance period. Therefore, the 23% reduction does not include the influence of the nuclear power station closure (). If energy efficiency measures had not been taken, CO₂ emissions would have increased by 25% as the CO₂ emission factor increased by as much as 36% due to the suspended operation of nuclear power stations and the increased operation of aging thermal power

Application to electricity saving after earthquake



Q.Did you apply the promotional system for the programme to electricity saving after the earthquake in 2011?

- “Significantly” made up 13%.
- “Yes” made up 68%.
- “No” made up 19%.

stations (). It should be noted that power saving at covered facilities will help achieve a 3% reduction even if the increased CO₂ emission factor is applied ().

Promotional system contributing to power saving after earthquake

CO₂ emissions were reduced during the serious energy crisis because large facilities responsible for 1/4 of total electricity consumption in Tokyo were covered by the programme and had already taken various energy efficiency measures. In a questionnaire to facilities in 2014, almost 80% of facilities answered that they effectively used the programme promotional system.

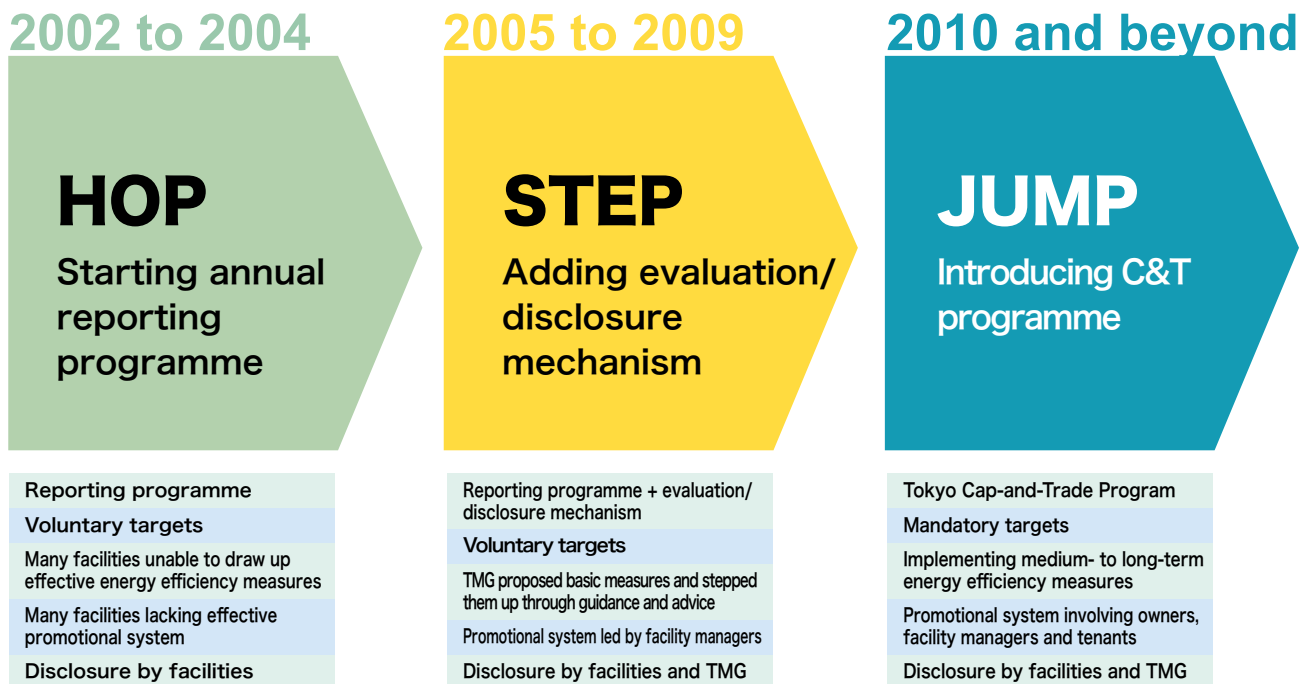
For the case reports from summer 2011 to summer 2013 (in Japanese) on smart electricity and energy saving measures taken at facilities in Tokyo after the Great East Japan Earthquake, visit the Tokyo Metropolitan Government website: http://www.kankyo.metro.tokyo.jp/climate/setsuden/good_practices/good_practices_2013summer.html

Stepping up the programme based on actual conditions for energy saving and CO₂ reductions at large facilities

Step-by-Step Evolution for Reductions

The Tokyo Metropolitan Government gradually evolved the voluntary reporting programme started in FY2002 and introduced the Tokyo Cap-and-Trade Program in 2010 to ensure CO₂ reductions.

Programme enhancements



Knowing your own CO₂ emissions

In 2002, many facilities did not have a clear policy to promote climate change countermeasures. At the Hop stage, we started requiring facilities to plan reduction targets and identify their own CO₂ emissions. However, reductions were not achieved at this stage, as seen in the results in FY2004, which show a 0.04% increase (0.3% increase in the commercial sector) from FY2001, with effective energy efficiency measures not planned either.

Putting energy efficiency measures onto menu

At the Step stage starting in FY2005, we organized voluntary-based fundamental energy efficiency measures onto the menu to encourage facilities to implement them, striving to advance their efforts toward energy saving through the evaluation and disclosure mechanism. This helped establish the basic energy efficiency measures in facilities to a certain degree. However, as seen in the results in FY2007 compared with the average of three years from FY2002 to FY2004, CO₂ emissions

were not reduced as expected at this stage either, increasing by 0.1% in the commercial sector and reduced only up to 4.2% across all sectors, including the industrial sector.

Turning energy efficiency measures into a challenge for management

In the course of giving guidance and advice on energy efficiency measures to officials at covered facilities, facility managers often reported cases of “we don’t have the human resources,” “we have no authority,” or “energy saving



Stakeholder meeting held in 2007



Introduction of the Tokyo Cap-and-Trade Program passed unanimously at the Second Regular Session in 2008 of the Tokyo Metropolitan Assembly

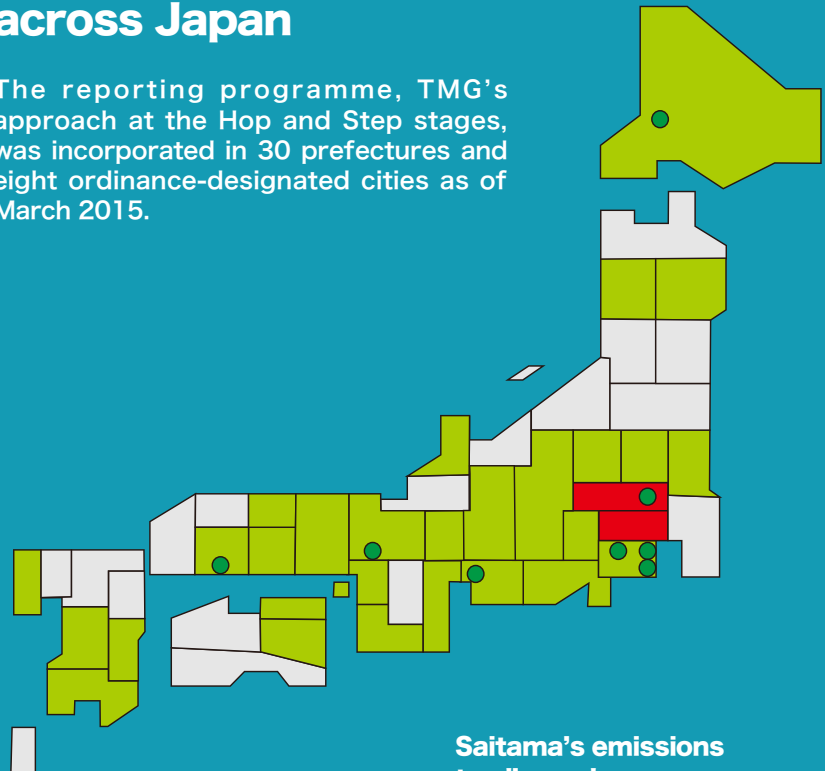
is not understood in the company” as reasons why the measures were not implemented. This told us that, in order to ensure full-scale reductions, we needed to escalate energy saving and CO₂ reductions issues handled by the field staff into a prioritized challenge that top management must seriously work on.

Programme introduced with support and understanding of business community

In the Tokyo Climate Change Strategy announced in June 2007, TMG proposed the launch of the Tokyo Cap-and-Trade Program, otherwise known as the Jump stage. We held several stakeholder meetings to gather different opinions from a broad range of participants: academics, trade associations, utilities and environmental NGOs. In response to opinions given against the introduction, we solved misunderstandings about emissions trading and explained in detail that we would design the programme reflecting the status quo of business operators in Tokyo. Later on at the Tokyo Metropolitan Assembly in June 2008, the introduction of the Tokyo Cap-and-Trade Program passed unanimously with support and understanding obtained from the business community.

Climate change countermeasures prevailing among local governments across Japan

The reporting programme, TMG’s approach at the Hop and Step stages, was incorporated in 30 prefectures and eight ordinance-designated cities as of March 2015.



- Prefectures with emissions trading programme
- Prefectures with reporting programme
- Ordinance-designated cities with reporting programme

Saitama’s emissions trading scheme

Saitama Prefecture started a Target Setting Emissions Trading Scheme in April 2011. Credit trading is allowed across the two programmes through the collaboration between Tokyo and Saitama.

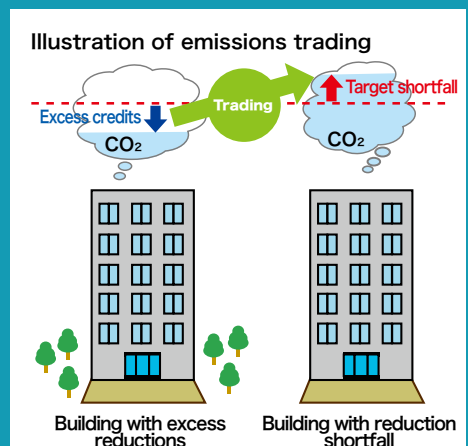


Local government partnership against climate change

A study session hosted by TMG in 2012 was renamed as ‘Local Government Partnership against Climate Change’ the next year. It has involved the increased number of local governments and strengthens the partnership among them.

Highlights of Tokyo C&T Program

The programme determines compliance factors for each facility to ensure reliable emissions reductions and enables them to meet their obligations by procuring excess credits from other covered facilities if internal reduction measures are not enough.



- Emission allowances are not distributed in advance. Excess reductions beyond the compliance factor can be traded.
- Other available credits include: Small and Midsize Facility Credits, Renewable Energy Credits, Outside Tokyo Credits, and Saitama Credits.

Cap-and-trade programme targeted at large facilities

Features of Tokyo Cap-and-Trade Program

The Tokyo Cap-and-Trade Program includes mechanisms that reflect actual conditions at facilities in Tokyo, taking into consideration the characteristics of a city that contains many buildings while also listening to the voices of businesses. The seven typical features of the programme are:

Urban cap-and-trade scheme

Cap-and-trade schemes are expanding into Europe, the Americas, and Asia as a means to ensure reliable CO₂ reductions at covered facilities.

In Tokyo, the commercial sector accounts for as much as 40% of total energy consumption, and emissions reductions in the sector are crucially important. This is why the Tokyo Metropolitan Government has brought in an urban cap-and-trade scheme that covers the commercial sector, including buildings, as well as the industrial sector, including factories.

Mandatory reductions based on facilities' actual conditions for ensured reductions

TMG has set a target to reduce citywide greenhouse gas (GHG) emissions by 25% below 2000 levels by 2020.

Based on emissions reductions necessary for achieving the goal, the Tokyo Cap-and-Trade Program has been designed with an initial five years from FY2010 to FY2014 as the start-up phase toward drastic CO₂ reductions, applying the 8% or 6% compliance factor, and the next five years as a period to establish and develop more drastic reductions, requiring a 17% or 15% reduction from facilities.

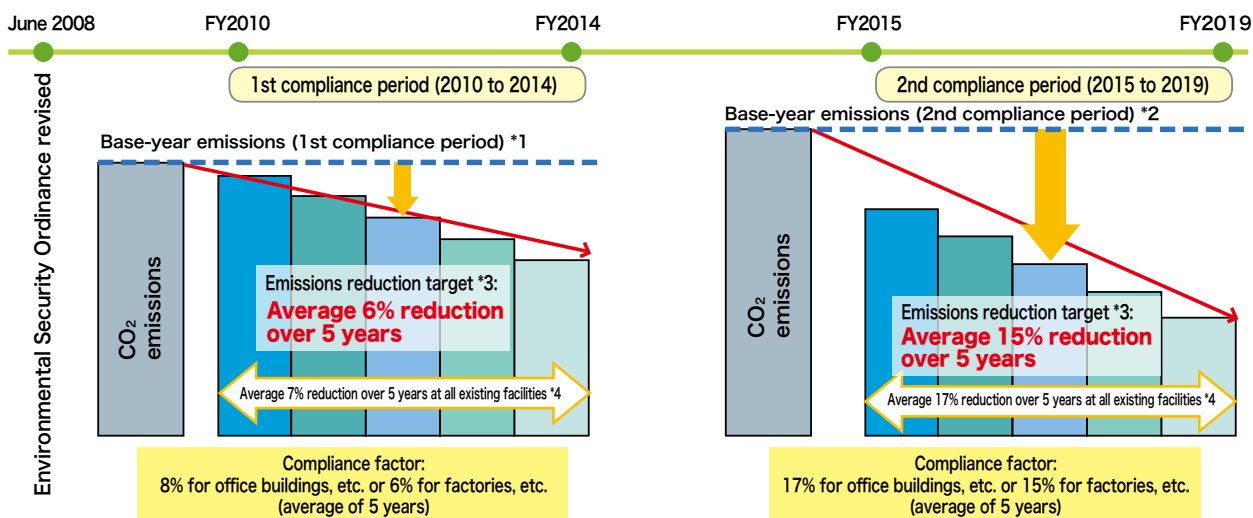
Evaluation of facilities' efforts

To value early implementation of measures, the base year can be selected from not only recent years but also any years dating back to FY2002. A facility demonstrating outstanding performance in emissions reductions is recognized as a "top-level" facility that will receive a compliance factor mitigated to 1/2 or 3/4.

Emphasizing energy saving at facilities by themselves

The programme allows a facility to procure excess reductions or credits from other facilities to meet its obligations. However, it emphasizes that the relevant facility should take internal

Two five-year compliance periods



*1 In principle, the base-year emissions are the average of any three consecutive fiscal years between 2002 and 2007. (The CO₂ emission factor in the first compliance period is the average of FY2005 to FY2007 at Tokyo Electric Power Company (TEPCO) and power producers and suppliers (PPS) that supply electricity to Tokyo, which is fixed at 0.382t-CO₂/MWh during the period)

*2 The base-year emissions are calculated in the same manner as in the first compliance period, using a CO₂ emission factor specific to the second compliance period. (The CO₂ emission factor in the second compliance period is the average of FY2011 and FY2012 at TEPCO and PPS that supply electricity to Tokyo, which is fixed at 0.489t-CO₂/MWh during the period)

*3 The emissions reduction targets in both compliance periods include emissions, etc. from facilities to be designated as 'Facilities with GHG Reporting Obligations (Reporting Facilities)' during each period.

*4 Existing facilities represent 'Reporting Facilities' as of the effective date of the emissions reduction target (April 1, 2010).

energy saving measures first and specifies as such in the ordinance.

To encourage energy saving, the programme allows only excess reductions beyond the obligations to be traded instead of distributing emission allowances in advance. It also helps facilities plan and carry out energy saving measures more easily by making each compliance period five years rather than a single year.

Mechanism to encourage measures from tenants

To realize emissions reductions across the whole leased building, cooperation between owners and tenants must be ensured. As a mechanism to obtain cooperation from tenants, the programme mandates that all tenants in covered facilities cooperate with owners in pursuing energy efficiency measures and requires large tenants to develop and submit an annual plan.

Verification system to ensure programme reliability

Emissions calculations need to be verified by a third party to ensure their accuracy. The Tokyo Metropolitan Government has had verification guidelines in place since the start of the programme to ensure consistency among verification agencies.

We have also introduced evaluation systems for verification agencies and annually disclosed excellent agencies with first-class verification accuracy as a reference for facilities to select an appropriate agency.

Requesting carbon reductions from energy suppliers through second compliance period

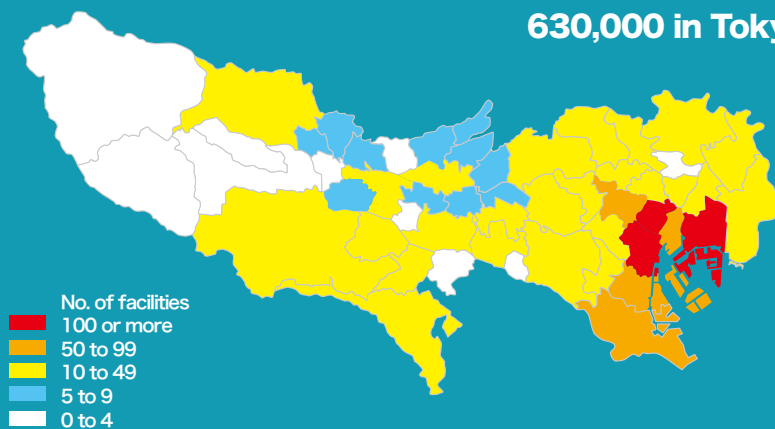
The programme puts emphasis on energy efficiency measures at covered facilities that are energy consumers. To encourage electricity and heating suppliers to improve CO₂ emission factors, "Mechanism for Selecting Low-Carbon Electricity" has been introduced for the second compliance period starting in FY2015. This mechanism defines equivalence to CO₂ reductions when covered facilities accept electricity or heating from TMG-certified suppliers with smaller emission factors.

Covered Facility Outlines

No. of facilities under Tokyo C&T Program

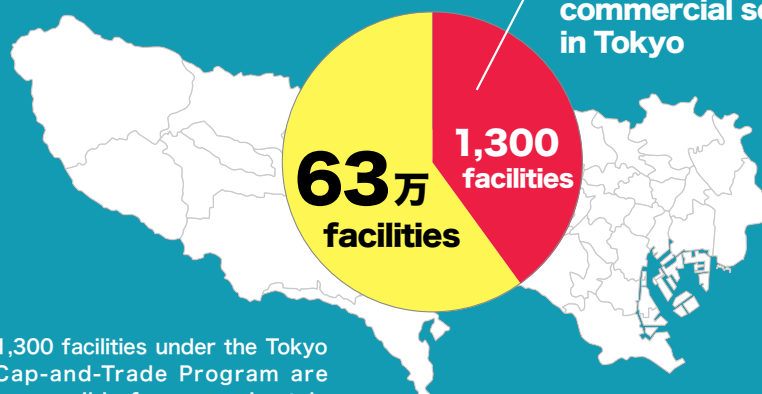
Around 1,300

facilities among 630,000 in Tokyo



Share of CO₂ emissions from industrial and commercial sectors in Tokyo

Around 40% of industrial and commercial sectors in Tokyo

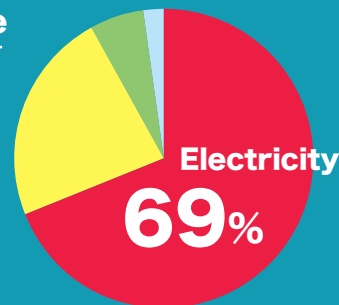


1,300 facilities under the Tokyo Cap-and-Trade Program are responsible for approximately 40% of CO₂ emissions from the industrial and commercial sectors.

Share of CO₂ emissions by source

- Electricity 69%
- City gas 23%
- Cold water, hot water and steam 6%
- Others 2%

In terms of share by source, electricity accounts for 69% of total CO₂ emissions. Electricity is responsible for 76% of total CO₂ emissions from office buildings.



Power consumption

Total in all facilities covered in FY2012

19,000 billion kWh.

Facilities under the urban cap-and-trade programme account for around 1/4 of power consumption in Tokyo.

Energy efficiency promoted by owners' strong determination as well as facility managers' technical skills

Unique Power Saving Plan at Each Facility

In FY2013, large facilities in Tokyo covered by the Tokyo Cap-and-Trade Program achieved a 23% reduction in CO₂ emissions. Behind this accomplishment, these facilities planned and implemented additional energy saving measures every year, including the introduction of LED illumination and energy efficient air conditioning equipment, in addition to reviews of operation management.

10,000 new energy saving measures planned and implemented

The total number of additional measures indicated in annual plans that have been planned and implemented by covered facilities has reached as many as 10,000. These plans are expected to realize total emissions reductions of approximately one million tonnes of CO₂. One of the purposes of the introduction of the programme - encouraging the planning of equipment replacement from a long-term perspective - is being steadily achieved.

New measures are planned at covered facilities every year and further reductions are anticipated in the future.

Two pillars for promoting energy efficiency: Introduction and operation of equipment

Covered facilities are taking additional emissions reduction measures, such as a shift to LED illumination, introduction of energy efficient air conditioning equipment and improved energy management of pumps. According to a questionnaire, more than 70% of facilities have come to select energy efficient equipment upon facility renovation, as a result of it being effective in reducing emissions.

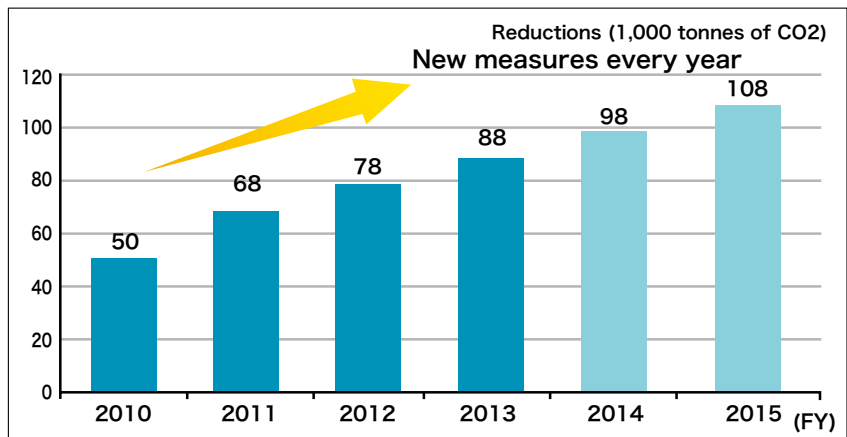
Covered facilities are also positive about carrying out operational measures. We tend to consider that these measures can be easily put into practice as they provide the benefit of lower energy expenses without investment. Actually, the operational measures need owners' strong determination toward reductions, a robust promotional system, cooperation and consensus in

facilities, and the technical skills of facility managers. For a smooth implementation of energy efficiency, the Tokyo Cap-and-Trade Program mandates maintenance of the promotional system alongside the nomination of a general manager and technical manager.

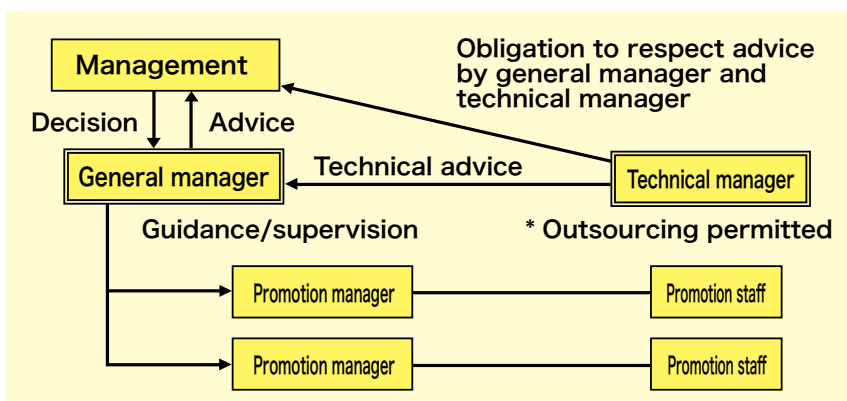
Effective use of professional support

Questionnaire results show that external consultants join energy saving activities at 20% of covered facilities in addition to in-house engineering teams and building management companies. It also seems that subcontractors and various professionals, such as instrumentation companies and design firms, are involved as well to propose and apply more technically in-depth energy efficiency measures.

Planning and implementation of energy efficiency measures at covered facilities

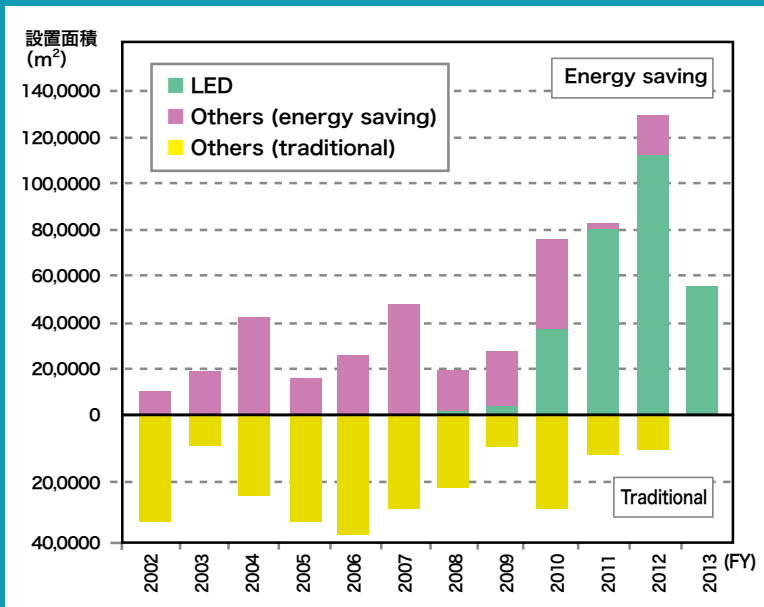


Promotional system



Prevalence of LED illumination

Lighting installation in commercial areas
Footprint comparison of energy saving and traditional illumination by FY of installation

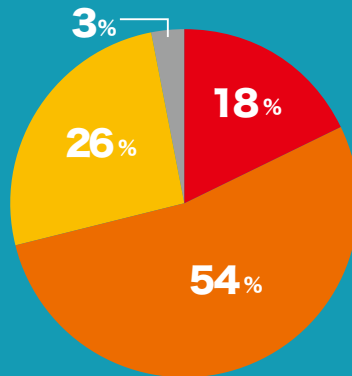


LED illumination has been much more increasingly installed and replaced in commercial and accommodation areas since FY2010. It accounts for more than 90% of illumination installed in FY2012, acting as a leading player in the replacement of illumination.

Examples of measures indicated in annual plans

Energy saving measures	Qty	t-CO ₂
Installation of energy efficient lighting and energy saving control	1,154	71,700
Installation of energy efficient pumps for air conditioners and energy saving control	349	28,100
Installation of energy efficient heat source equipment	312	133,100
Installation of energy efficient outside air cooling systems	288	19,900
Installation of energy efficient air conditioning equipment	286	27,900
Installation of energy efficient fans	234	12,000
Proper timing of starting up air-conditioning before using rooms	128	10,500
"Cool Biz" and proper room temperatures during summer	82	10,000

The programme leads to more than 70% of facilities incorporating energy efficient equipment



Q. Have you become more aggressive in incorporating energy efficient equipment upon facility renovation?

- "Significantly" made up 18%.
- "Yes" made up 54%.
- "Have already incorporated" made up 26%.
- "No" (including no incorporation) made up 3%.

Source: Questionnaire on Tokyo Cap-and-Trade Program (in Japanese) in 2014

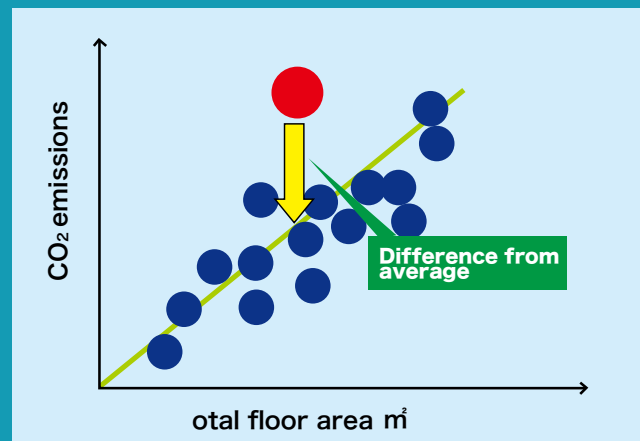
TMG's support for driving additional measures

For facilities positively planning new emissions reduction measures, we are providing a variety of support, including TMG Energy Efficiency Feedback Report, seminars on energy efficiency examples and free energy audits.

TMG Energy Efficiency Feedback Report

Based on the Annual GHG Emissions Reduction Plan, etc. submitted by large facilities, we have prepared a TMG Energy Efficiency Feedback Report that aggregates CO₂ emissions, status of reduction measures and other data in response to the voices of the covered facilities: "What progress have we made?" and "What measures are taken by other facilities?" We provide the facilities with the record for the purposes of comparison in a specific business type and planning future reduction measures.

Comparison of CO₂ emissions relative to total floor area



Total floor area and CO₂ emissions are plotted for each business type. In the record delivered to a facility, its mark is indicated in red for the comparison of CO₂ emissions in the same industry.

Lowering compliance factors for facilities with excellence in promotional systems as well as in equipment introduction, use and management

Around 7% of Facilities Winning Top-Level

Facilities certified as top-level receive lower compliance factors according to their progress in implementing climate change countermeasures. Covered facilities' attempts to obtain top-level certification promote additional energy saving. The certification standards for top-level facilities are used as guidelines for energy efficiency measures at the design stage for construction or upgrades.

87 facilities obtaining top-level or near-top-level certification

The Tokyo Cap-and-Trade Program certifies facilities demonstrating outstanding performance in the promotional system as well as in the introduction, use and management of energy efficient equipment as top-level or near-top-level facilities. These facilities receive a compliance factor mitigated to 1/2 or 3/4. Among approximately 1,300 large facilities, 40 were certified as top-level facilities and 47 as near-top-level facilities by FY2014. By appreciating eminent facilities, we are aiming to stimulate other facilities and increase their awareness towards the acquisition of top-level certification.

Checking the certification standards for saving more energy

The certification standards for top-level facilities are based on the highest-level energy efficiency measures feasible at present, determined by reference to the latest research on green buildings and the hearing of manufacturers' opinions. Evaluation items contain not only the promotional system but also the introduction, use and management of energy efficient equipment. For example, there are 228 evaluation items for Category I (covering office buildings). The evaluation items consist of various energy efficiency measures that can be addressed by existing and new facilities and those with a large or small total floor area.

The year of completion of facilities with top-level or near-top-level certification ranges from the 1950s to 2010s. Large facilities with total floor area more than

400,000 m2 have also been certified as top-level or near-top-level facilities.

Certified facilities can check these energy saving measures to find those not yet performed and promote additional energy saving by fulfilling the missing measures.

Guidelines for energy efficiency measures at design stage for construction or upgrade

To build highly-efficient systems, energy efficient equipment should be introduced and its capacity should be allocated properly, with energy saving control, including variable flow control, in place. Operating such a system with improved efficiency will eventually lead to further energy savings.

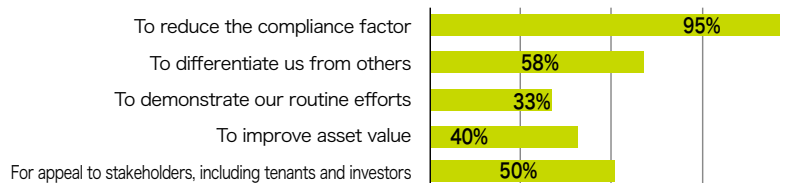
New buildings and major renovations are good opportunities to incorporate energy efficient systems. Having a broad range of energy saving measures that

exert maximum operational effects in the design process, the certification standards for top-level facilities are increasingly used as reference guidelines for designing buildings.

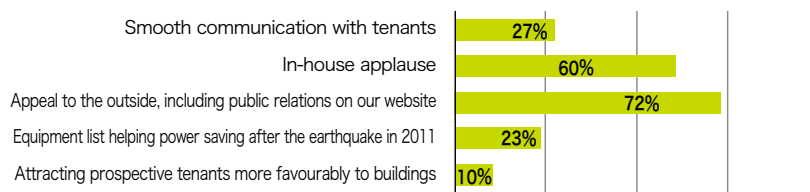
Transferring top-level facilities' expertise to others

We will communicate achievements made by top-level and near-top-level facilities to other facilities by holding seminars and other educational events.

Q1. Why have you obtained top- (near-top-) level certification?

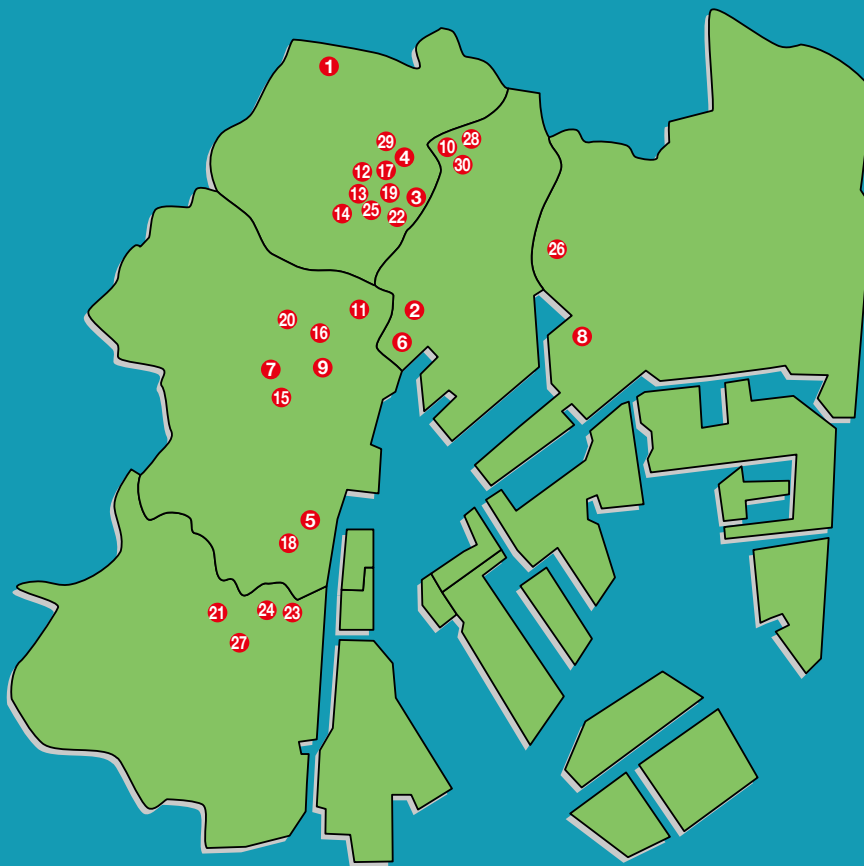


Q2. Have you experienced any effects of obtaining top- (near-top-) level certification other than the mitigated compliance factor?



Source: Questionnaire on Tokyo Cap-and-Trade Program (in Japanese) in 2014

Top-Level Facilities Certified in the First Compliance Period (FY2010 to FY2014)



Category I

- 1 Tokyo Head Office, Otsuka Corporation
- 2 Ginza Mitsui Building
- 3 Sapia Tower
- 4 Shin-Otemachi Building
- 5 Sony City
- 6 Dentsu Building
- 7 Tokyo Midtown
- 8 Toyosu 3-Chome Heat Supply Facility
- 9 Tranomon Towers Office
- 10 Nihonbashi Mitsui Tower
- 11 Hibiya Kokusai Building
- 12 Marunouchi Building
- 13 Mitsubishi Shoji Building
- 14 Meiji Seimei Kan Building, Meiji Yasuda Life Building
- 15 Roppongi Hills (Roppongi Hills Mori Tower, Grand Hyatt Tokyo, Keyakizaka Complex)

- 16 Homat Viscount, Akasaka Intercity
- 17 Gran Tokyo North Tower
- 18 JR Shinagawa East Building
- 19 Shin-Marunouchi Building

- 20 Akasaka Garden City
- 21 Art Village Osaki Central Tower
- 22 Gran Tokyo South Tower
- 23 Shinagawa Seaside East Tower
- 24 Shinagawa Seaside West Tower
- 25 Marunouchi Park Building, including Mitsubishi Ichigokan

Category II

- 1 Konica Minolta Tokyo Site, Hino
- 2 Inagi Pumping Station, Bureau of Waterworks, TMG
- 3 Tokyo Tama Plant, Morinaga Milk Industry
- 4 Konica Minolta Tokyo Site, Hachioji
- 5 Nerima Water Station, Bureau of Waterworks, TMG
- 6 Hamura Pumping Station, Bureau of Waterworks, TMG
- 7 Yodobashi Water Station, Bureau of Waterworks, TMG
- 8 Wadabori Water Station, Bureau of Waterworks, TMG
- 9 Tokyo Plant, Morinaga Milk Industry

Facilities certified in FY2014



26
Eitai Dia Building
14-5, Eitai 1-chome, Koto-ku



27
Shinagawa R&D Center
Daiichi Sankyo Company
2-58, Hiromachi 1-chome, Shinagawa-ku



28
Nihonbashi Muromachi
Nomura Building
4-3, Muromachi
2-chome, Nihonbashi,
Chuo-ku



29
Sumitomo Mitsui Banking
Corporation Building
1-2, Marunouchi 1-chome,
Chiyoda-ku



30
Muromachi Higashi Mitsui
Building
2-1, Muromachi 2-chome,
Nihonbashi, Chuo-ku

Evaluation and disclosure of tenants' efforts in energy saving measures

Encouraging Tenants' Efforts to Promote Energy Efficiency across Whole Building

Energy efficiency measures in leased buildings, which need the cooperation of tenants, are often hindered by owners' concerns about declined service quality due to energy saving. In FY2014, the Tokyo Metropolitan Government launched a mechanism to evaluate and disclose tenants' commitment in energy saving measures to raise tenants' awareness of energy efficiency.

Cooperation between owners and tenants is the key

In large facilities with tenants, energy efficiency measures cannot necessarily be achieved by building owners' efforts alone. To realize emissions reduction across the whole building, cooperation between owners and tenants must be ensured.

Mandatory submission of annual plan by tenants

Given the above background, the Tokyo Cap-and-Trade Program mandates that all tenants in covered facilities cooperate with building owners in pursuing energy efficiency measures.

To encourage a smoother uptake of energy efficiency measures in leased buildings, large tenants are designated as compliance tenants if they either (1) occupy a floor area of 5,000 m² or greater, and/or (2) consume 6 million kWh or more annually of electricity. We require them to submit their own emissions reduction plan and take measures in compliance with the plan.

Energy efficiency measures spreading to tenants

According to a questionnaire conducted in summer 2013 on power saving measures at facilities in Tokyo, 56% of facilities answered that tenants proposed electricity saving measures to owners. This implies that tenants in covered facilities not only cooperate with

owners in energy efficiency measures but also develop and implement the measures by themselves.

One energy saving measure that can be taken by tenants on their own, "unplugging when not in use," was carried out by only 26% of tenants in summer 2010. We later discovered that it had been adopted by approximately 50% of tenants in the summers of 2011 to 2013.

The survey results show that tenants' cooperation in pursuing energy efficiency measures has been firmly established.

Further reductions at compliance tenants

There are approximately 800 compliance tenants at present. Some of them cannot implement concrete energy saving measures due to a lack of expertise or human resources for that purpose.

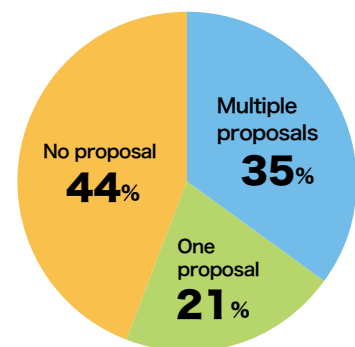
Therefore, the Tokyo Metropolitan Government has introduced Mechanism for Evaluation and Disclosure of Actions against Climate Change at Compliance Tenants (Tenant Evaluation

and Disclosure Program) to encourage energy saving measures for further reductions at compliance tenants.

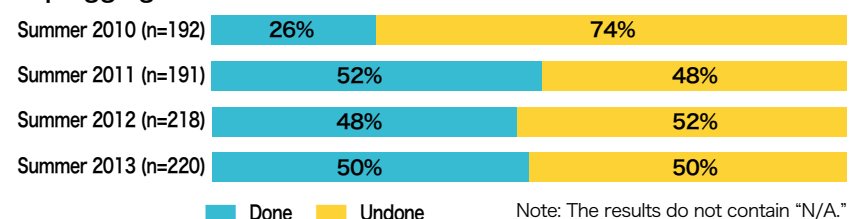
Purposes and effects of mechanism

The purpose of the Tenant Evaluation and Disclosure Program is to help business operators driving energy efficiency measures gain social recognition and strengthen their awareness of energy saving. During that process, they are expected to promote in-house measures and identify energy efficiency improvement opportunities.

Proposal of electricity saving measures by tenants to owners in summer 2013



Unplugging when not in use



Note: The results do not contain "N/A."

Source: Questionnaire on Power Saving Measures at Large Facilities in Summer 2013 (in Japanese)

The disclosure of excellent compliance tenants allows other tenants to compare their effort levels with those of the compliance tenants and use their approaches as reference. This will give general tenants an incentive to aim for the higher levels.

Checklist for evaluating efforts and disclosing results

The rating in the Tenant Evaluation and Disclosure Program depends on the checklist and actual CO₂ emissions.

The checklist contains menus of energy saving measures tailored to compliance tenants' business categories, which allows the self-diagnosis of progress.

To be more specific, compliance tenants are classified into four major categories that account for a large share of emissions: office, commerce, accommodation, and data centre. Each category consists of items related to the promotional system for energy saving measures and the introduction and operation of equipment.

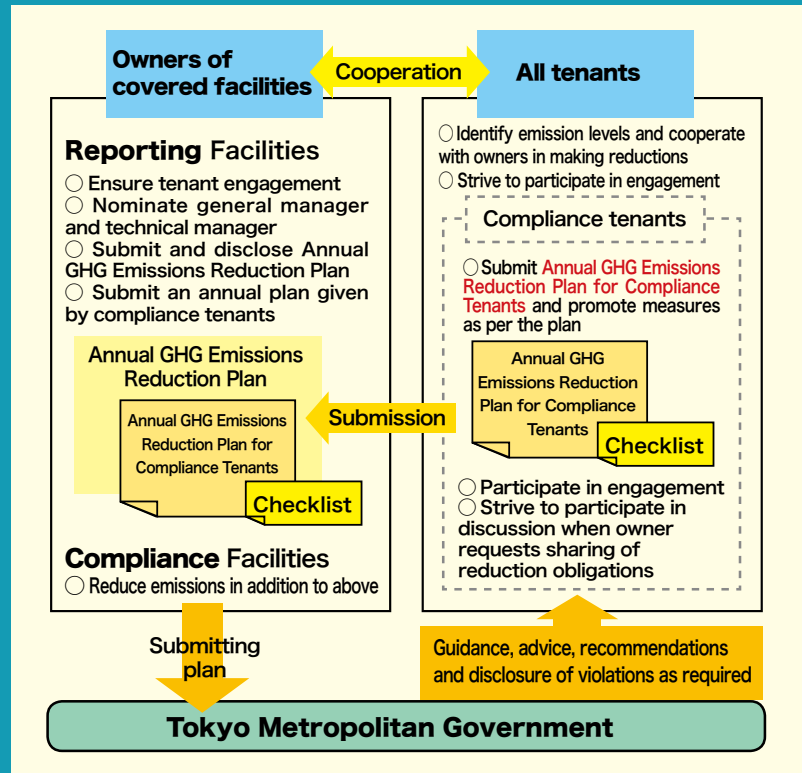
Compliance tenants are evaluated based on actual CO₂ emissions (status of CO₂ reductions) as well as the checklist.

Outstanding tenants recognized in the future

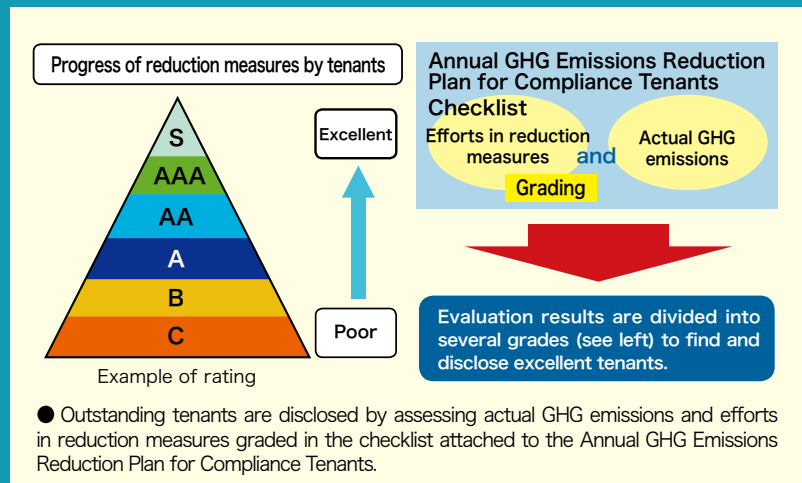
Following the disclosure of the evaluation results, compliance tenants achieving excellent scores and aggressively working on energy efficiency measures are announced as best practices in the annual tenant energy saving seminar and other events.

Outstanding compliance tenants will also be recognized in the future.

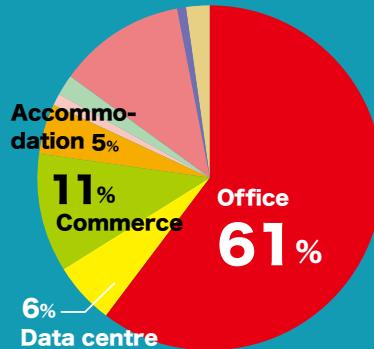
Main roles of owners and tenants in the programme



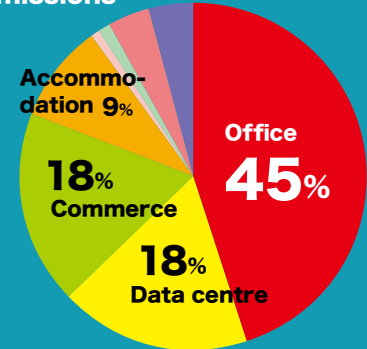
Tenant Evaluation and Disclosure Program



Ratio of compliance tenant category by number of tenants



Ratio of compliance tenant category by emissions



Medical care 1% Culture 2%
Logistics 12% Parking lots 1%
Factories and others 2%
Broadcasting stations 0% Education 0%

Medical care 1% Culture 1%
Logistics 4% Factories and others 2%
Broadcasting stations 0% Education 0%
Parking lots 0%

Note: Figures are based on actual results in FY2013.

Just moments away from full-scale implementation

Emissions Trading Scheme to Meet Reduction Targets

In addition to taking their own energy saving measures to reduce emissions, covered facilities can use emissions trading to fulfill reduction requirements in line with their equipment replacement plan or based on a rational decision on the cost of measures.

Features of trading scheme in the programme

The emissions trading scheme provides a flexible framework that allows the use of Small and Midsize Facility Credits that promote reductions at small and medium facilities in Tokyo and Renewable Energy Credits for encouraging the introduction of renewables as well as excess emission reductions or excess credits at covered facilities. Moreover, the trading scheme accepts emissions reductions at facilities not covered by the programme.

For the fulfilment of emissions reduction requirements, there are five-year compliance periods followed by compliance adjustment periods of one and a half years. Regarding the first compliance period (FY2010 to FY2014), facilities' emissions and necessary amount of traded emissions are confirmed in FY2015. If reductions are insufficient, credits have to be procured through emissions trading to fulfill emissions reduction requirements by the end of September 2016 when the compliance adjustment period for the first compliance period expires.

Estimated demand and supply in trading

In the first compliance period, around 90% of facilities will be able to meet the obligations on their own by aggressively carrying out internal energy saving measures. Therefore, it is expected that emissions reductions will be much greater than reduction shortfall as a whole. In detail, approximately 900 million tonnes of excess emissions reductions

or excess credits will be issued, while the amount of reduction shortfall needing credit procurement will be approximately 400,000 to 500,000 tonnes, as estimated based on the actual results in FY2012.

Our questionnaire to facilities shows that many of them will carry over excess emission reductions to the next compliance period, with only 6% actually considering selling excess credits. This implies that many business operators are not promoting emissions reduction measures to sell the credits but to meet their obligations.

Achievements in emissions trading

The amount of issued credits has exceeded 900,000 tonnes so far while reduction shortfall is expected to be 400,000 to 500,000 tonnes, which means the amount issued is greater than the demand. Considering the

fact that around 90,000 tonnes of credits had been traded by the end of February 2015, it is anticipated that trading will become brisker toward the end of September 2016 when the compliance adjustment period for the first compliance period expires.

There seem to be many facilities that have not engaged in emissions trading as the programme is the first cap-and-trade scheme in Japan. The Tokyo Metropolitan Government has announced the amount of issued credits and trading performance* on a monthly basis to ensure smooth trading until the end of the compliance adjustment period. We are also providing trading support, such as the announcement of transaction prices estimated in the case of standard trading, which are derived from the hearing results and the holding of matching events for sellers and buyers.

Credits available with emissions trading

Type	Description
Excess Emission Reductions	Excess credits from other covered facilities
Small and Midsize Facility Credits	Credits obtained from CO ₂ reductions voluntarily achieved by small and medium facilities in Tokyo
Renewable Energy Credits	Credits obtained from generation of renewable energy, including green energy certificates
Outside Tokyo Credits	Credits obtained from CO ₂ reductions voluntarily achieved by large facilities outside of Tokyo
Saitama Credits	Credits from facilities covered by the Saitama Prefecture Target Setting Emissions Trading Scheme, a programme similar to the Tokyo Cap-and-Trade Program in an adjacent prefecture

For emissions trading performance and other information, visit:
http://www.kankyo.metro.tokyo.jp/climate/large_scale/cap_and_trade/data.html

Partnership to make cap-and-trade programmes popular International Cooperation Activities through ICAP

The Tokyo Metropolitan Government has participated in the International Carbon Action Partnership (ICAP) as a committee member to support its operation. ICAP is an international organization consisting of national and state governments and agencies that are aggressively attempting to reduce greenhouse gases.

Joining ICAP first in Asia

In October 2007, ICAP was established as a forum where national and state governments and agencies would exchange expert knowledge and opinions to spread GHG cap-and-trade programmes throughout the world. Having committed to the introduction of Japan's first cap-and-trade programme in 2008, TMG joined ICAP in May 2009 as the first member from the Asian region.

Three pillars of ICAP activities

- (1) Forum: Open sessions and members' review meetings are held to discuss technical matters for emissions trading programmes.
- (2) Training and support: Training is provided for government officials of emerging and developing countries interested in adopting emissions

trading programmes.

(3) Information sharing and provision: Members from around the world share up-to-date information on emissions trading programmes currently in progress or in the preparation stage. Various events are held in parallel with the United Nations Framework Convention on Climate Change (UNFCCC) meetings and in cooperation with the International Emissions Trading Association (IETA).

Contribution to international spread of cap-and-trade programmes

In June 2010, the second year of our membership, the ICAP Tokyo Cap and Trade Conference 2010 was held, where members and experts from both home and

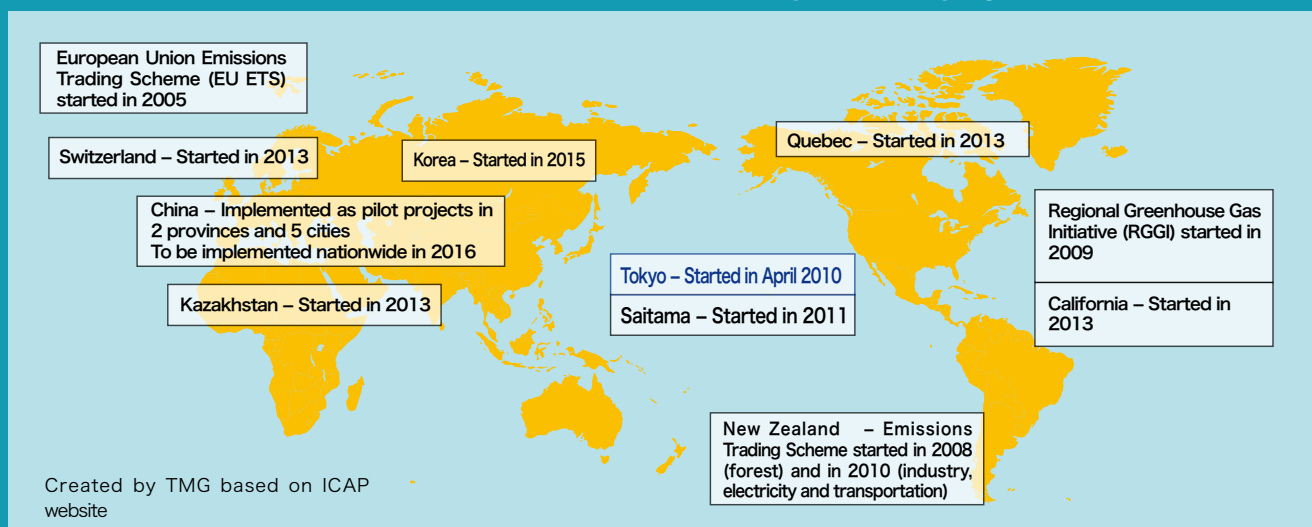


abroad discussed the latest trends of cap-and-trade programmes worldwide and the future prospects of the international carbon market. Since 2011, we have been actively involved as a committee member in the operation of ICAP in terms of its activity policies and budgeting. The Tokyo Cap-and-Trade Program is attracting attention as the world's first scheme that covers not only the industrial sector but also the commercial sector, including buildings. TMG participates as a lecturer in annual training provided by ICAP to introduce the programme and give advice on the operation of similar schemes.

Trends of cap-and-trade programmes worldwide

The Tokyo Cap-and-Trade Program is one of the world's leading cap-and-trade programmes. We will positively promote climate change countermeasures by working with frontrunner countries and regions on a global basis.

Trends of cap-and-trade programmes worldwide in 2013



Mitsui Fudosan owns and operates the largest number of top-level facilities

As an All-Time Leading Company in the Environmental Field

In FY2014, the Tokyo Metropolitan Government certified five facilities as top-level, which included the Muromachi Higashi Mitsui Building and Sumitomo Mitsui Banking Corporation Building (both completed in 2010) owned and/or operated by Mitsui Fudosan.

Strictness makes top-level certification more valuable

Mitsui Fudosan started the application process to be certified as top-level facilities in FY2010, when the certification system started. Since then, the company has had 13 facilities (16 buildings) certified as top-level or near-top-level, and currently owns the largest number of certified facilities.

We asked why they keep trying. "We always want to be a leading company in urban development," answered Takeshi Hamano, Manager, Environment and Energy Service Department, Office Building Division, Mitsui Fudosan. "Environmental consciousness is particularly important for that purpose, and we are always doing our best to stay as a leading company in the environment arena as well. We are conducting business activities with the top-level certification in mind."

To obtain the top-level certification, facilities have to meet very stringent requirements: 228 audit items must be cleared. The acquisition of the certification proves that the superior and advanced environmental performance of a building is backed up by an independent third party.

The company has formed a committee known as 'CO2 Reductions Conference' at each facility as a core strategy to obtain the certification. Consisting of Mitsui Fudosan, tenants, building management companies, equipment suppliers and outsourced advisors on energy efficiency technologies, the conference identifies problems with facilities, reviews solutions, solves the problems and evaluates the results, through the so-called PDCA cycle.

Even mature facilities aiming at certification to accumulate expertise

Facing rigorous screening, the company groped its way at first. It decided to select new properties to apply

for the certification, which included the Nihonbashi Mitsui Tower (completed in 2005) and Tokyo Midtown (completed in 2007), both having the latest equipment and up-to-date information available. Through this process, they found the management of documents, such as equipment ledgers and construction plans, was a prerequisite for the certification.

In FY2012, the company succeeded in having the Kasumigaseki Building, which was completed over 40 years ago, certified as a near-top-level facility, taking more than one year to organize the relevant material and make other preparations. "We dared to make the application to prove we are a leading company in the operation of aged buildings as well," said Hamano. Such approaches have built valuable expertise.

The Sumitomo Mitsui Banking Corporation Building, certified as a top-level facility in FY2014, is an office building with light ducts, illumination control, 20-kW solar photovoltaics and energy efficient heat source/thermal storage equipment.



Takeshi Hamano, Environment and Energy Service Department, Office Building Division, Mitsui Fudosan
(As of March 2015)

On the other hand, the Muromachi Higashi Mitsui Building is located in the Nihonbashi Muromachi Higashi district, which is involved in the Nihonbashi Revitalization Plan, and is used as a mixed use facility comprising offices, stores and multipurpose halls. However, the role of the building itself is beyond that.

Integrated control of heat source and power supply

Environmental measures taken at the Muromachi Higashi Mitsui Building, such as high-performance heat reflective glass, achieve a PAL (perimeter annual load) reduction ratio of approximately 25% in offices, decreasing air conditioning load. Ilex pedunculosa tall evergreen trees are planted as greenery on the mid-level floors.

However, the most distinctive features of the building are its electrical equipment and heat supply mechanism. Special high-voltage power receiving

History of acquiring top-level facility certification

Year	Top-level facilities	Near-top-level facilities
FY 2010	Nihonbashi Mitsui Tower Tokyo Midtown Ginza Mitsui Building	Nihonbashi 1-Chome Building Shiodome City Center
FY 2011	Gran Tokyo North Tower	Gate City Ohsaki Akasaka Biz Tower (management)
FY 2012	Gran Tokyo South Tower	Kasumigaseki Building (Tokyo Club building) Shinjuku Mitsui Building
FY 2014	Muromachi Higashi Mitsui Building (Muromachi Furukawa Mitsui Building) (Muromachi Chibagin Mitsui Building) Sumitomo Mitsui Banking Corporation Building	
Total: 13 facilities (16 buildings)	7 facilities (9 buildings)	6 facilities (7 buildings)

Mitsui Fudosan owns and/or operates 13 facilities (16 buildings) that have been certified as top-level or near-top-level.

equipment has been adopted to distribute power to the Muromachi Furukawa Mitsui Building and Muromachi Chibagin Mitsui Building (both completed in February 2014) for integrated power management, contributing to energy efficient operation of the facilities. The Muromachi Higashi Mitsui Building also consolidates air conditioning and heat source equipment into a district heating and cooling system to supply steam and cold water to the two buildings. The three buildings' energy usage was designed to be controlled in an integrated manner from the beginning.

"Connecting multiple facilities with different energy demand levels serves to achieve peak shaving and more efficient heat supply," said Hamano.

To optimize the supply of electrical and thermal energy, BEMS has been adopted and an integrated heat source control system has been incorporated upon building extensions. Based on the operating conditions of the air conditioning and heat source equipment along with weather prediction data, all equipment is operated at optimum efficiency. This helps reduce primary energy consumption and CO2 emissions, serving to cope with power saving requested by the district.

One of their challenges is the handling of events. An event held in a multipurpose hall attracts a large crowd of people, increasing the air conditioning load. The local arrangement of air conditioning at the entrances certainly works, but the doors sometimes cannot be closed due to a continuous flow of people. "Our challenge is to find an effective way that keeps this place comfortable for customers," said Hamano.

Developing unique operational guidelines for saving energy in buildings

Strict criteria are imposed on top-level facility certification. Mitsui Fudosan took advantage of its experience in obtaining the certification to develop its own Operational Guidelines for CO2 Reductions in FY2012. The development was also driven by the revision of the Energy Conservation Law, which now placed energy management obligations on each facility as a whole.

"We have determined the guidelines contents to enable energy saving and CO2 reductions without sacrificing tenants' convenience and amenity," concluded Hamano.

Their guidelines are classified by building sizes, the availability of caretakers, etc. and contain 100 check items for large buildings, for example, based on which self-rating is performed. The guidelines are used in the PDCA cycle and revised by adding and removing the items according to the necessity. Energy saving is always evolving at the company.



Building name	Muromachi Higashi Mitsui Building
Address	2-1, Muromachi 2-chome, Nihonbashi, Chuo-ku, Tokyo
Total floor area	41,066 m ²
Application	Office, store, hall
Completion	October 2010
Building name	Sumitomo Mitsui Banking Corporation Building
Address	1-2, Marunouchi 1-chome, Chiyoda-ku, Tokyo
Total floor area	80,047 m ²
Application	Office, store, hall
Completion	July 2010



Heat source equipment in Muromachi Higashi Mitsui Building

Heat source equipment mainly consists of turbo and absorption refrigerators. The turbo refrigerators are operated with night-time power. Cold water is made and retained in water thermal storage tanks, then supplied for cooling. The heat source equipment operates depending on cooling load. Once-through boilers are used for heating. The district heating and cooling plant supplies steam and cold water to the Muromachi Furukawa Mitsui Building and Muromachi Chibagin Mitsui Building.



Central monitoring and BEMS systems in Muromachi Higashi Mitsui Building

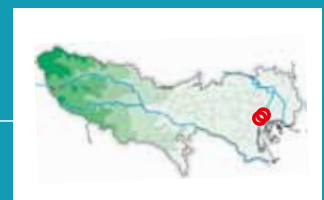
A noteworthy feature is the use of an on-demand optimal control system for heat source. Based on the operating conditions of the air conditioning and heat source equipment and weather prediction data, energy needed on the next day is simulated to enable all equipment to operate at optimum efficiency. This means that the building has already introduced the technologies that will be treated as 'Additional Items' among the evaluation items for top-level facilities in the second compliance period.



Sumitomo Mitsui Banking Corporation Building

The exterior design features horizontal and vertical louvers. Arranged by calculating the relationship between the orientation and insolation, the vertical columns and horizontal louvers mitigate direct sunlight entering the building, helping reduce air conditioning load. This demonstrates that the fusion of design and functionality has been emphasized.

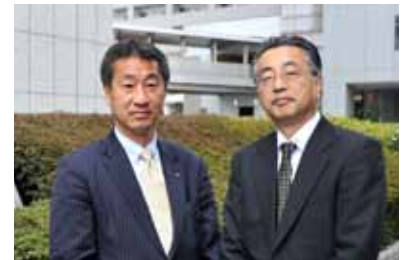
and Muromachi Chibagin Mitsui Building.
Muromachi Higashi Mitsui Building
 2-1, Muromachi 2-chome, Nihonbashi, Chuo-ku, Tokyo
Sumitomo Mitsui Banking Corporation Building
 1-2, Marunouchi 1-chome, Chiyoda-ku, Tokyo



Collaboration between two from different worlds: Sumitomo Bakelite and Nomura Real Estate Asset Management

Energy Saving Partnership with Real Estate Investors

Rights in commercial buildings have become complicated. Multiple owners are taken for granted and the number of real estate investment trust (REIT) properties is increasing. Cooperation by investment fund members as well as owners and tenants is indispensable for energy efficiency and environmental measures in buildings.



Nobuyuki Tamura, Sumitomo Bakelite (right)
Miyuki Kato, Nomura Real Estate Asset Management (left)

Building owned by two companies from different industries

A split-incentive problem between owners and tenants has become a major obstacle to energy saving strategies in leased buildings. In a building where electricity bills are paid based on the amount used, energy saving provides tenants with a tangible benefit of cost-savings while there is little direct benefit for owners who pay equipment costs. However, the Tennozu Park Side Building, part of which is occupied by tenants, succeeded in turning all illumination into LED across the whole building in January 2013.

The Tennozu Park Side Building is virtually owned by Sumitomo Bakelite and Nomura Real Estate Office Fund.

In the 22-storey building, Sumitomo Bakelite owns the 16th floor and above to use as its headquarters, and Nomura Real Estate Office Fund owns the 15th floor and below. The asset management of this REIT property is entrusted to Nomura Real Estate Asset Management. Energy saving usually needs capital investment. "Our job is to ensure dividends for investors by operating the property as a leased building. We always have to think about that," explained Miyuki Kato, Manager, Asset Management, NOF Investment Management, Nomura Real Estate Asset Management.

Conversely, Sumitomo Bakelite is a manufacturer that strives to reduce CO₂ emissions by 25% below FY2005 levels by FY2020. This could mean that the building is owned by the two companies of contrasting natures.

Using ESCO to achieve energy saving and cost reductions

Energy saving was triggered by cost reductions suggested by an ESCO in 2006. "Now we knew if we

used the ESCO we could replace the CO₂ concentration controllers in the underground parking without any additional costs," said Nobuyuki Tamura, General Manager, Legal, Corporate General Affairs, Sumitomo Bakelite. "We were interested in the story that we were able to save energy and costs at the same time."

Moreover, they could apply for subsidies by participating in the emissions trading system in Japan.

Nomura Real Estate Asset Management agreed with the offer and worked on improvements in the parking lot: intermittent operation control of fans, variable flow control of secondary pumps, and higher illumination efficiency. The ESCO service allowed them to reduce CO₂ by 284 tonnes annually.

The efforts made so far were centred on backyard energy efficiency, not involving tenants. It was the Great East Japan Earthquake that changed

everything and made power saving a mission.

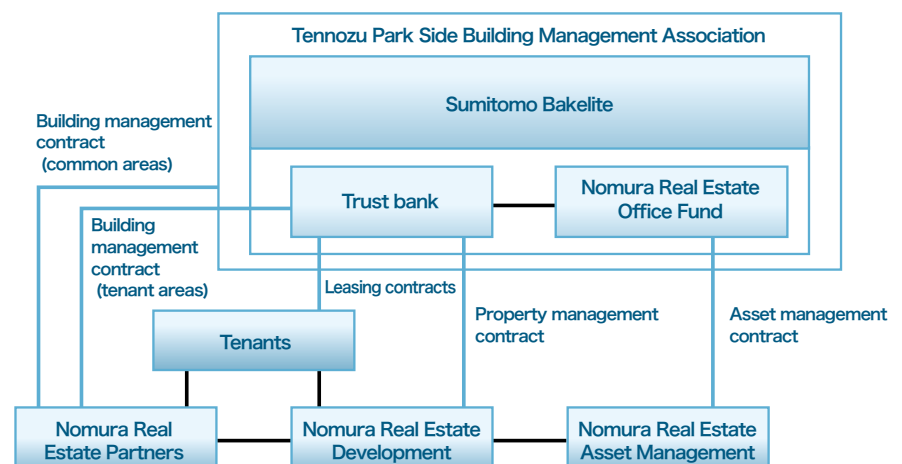
"Tenants' cooperation was tremendous," said Kato. "Partly turning off fluorescent lights was quite natural. Some tenants were even working in the darkness."

Installing LED in the entire building to reduce power consumption by 40%

For further electricity saving, Sumitomo Bakelite and Nomura Real Estate Asset Management identified how energy was used in the building. Air conditioning was driven using district heating and cooling as a heat source, which revealed that lighting was consuming the largest amount of electricity.

LED illumination was soon deliberated. However, switching to LED across the building would need capital investment of more than JPY 100 million. Sumitomo Bakelite accepted the introduction

Party relationships in Tennozu Park Side Building



of LED as the headquarters building should take the initiative in implementing appropriate measures while its factories were fully committed to energy saving. However, Nomura Real Estate Asset Management needed to consider the impact on dividends to investors. "If we paid for the replacement at one time, dividends would be significantly reduced even though we received subsidies," said Kato. "This might prevent Nomura Real Estate Office Fund from replacing the lighting on an ongoing basis."

In the middle of the argument, they came to know that subsidies would be granted to ESCO-based leasing as well, which would minimize the impact on dividends. They decided to incorporate LED taking the long term benefit into consideration.

Tenants were supportive and all of them immediately approved the application for subsidies. Nomura Real Estate Partners in charge of building management helped explain the LED performance to tenants and evaluate LED when the selection was made. Eventually, 9,223 LED lights were installed, reducing power consumption by approximately 40%. The introduction of the LED illumination was successful as the result of cooperation between the owners, tenants, and building management company.

Acquisition of Silver certification in Development Bank of Japan's building rating programme

The Tennozu Park Side Building is committed to exchanging information on the environment and energy efficiency. The Management Association holds annual energy saving meetings involving tenants, owners, and the building management company, disclosing information on CO₂ reductions achieved so far, the adoption of new energy efficient equipment and other issues.

The building has also introduced a system that allows the tenants to monitor energy consumption in real time, i.e. so-called visualization, to drive the collaboration with tenants for improved energy efficiency. These activities have been valued by third parties. For example, Development Bank of Japan has developed the Green Building Certification to assess real-estate values in terms of consideration for the environment and society. The Tennozu Park Side Building gained the Bronze rating initially and moved up to the Silver rating due to the adoption of the LED illumination.

The installation of the LED lights has been an exemplary model for Nomura Real Estate Asset Management. "REIT properties are not held in high esteem if they are behind social trends," said Kato. The company is promoting energy saving measures, including LED illumination, at its other properties.

We are seeing a transition to the era where the environmental performance enhances buildings' value.



Building name	Tennozu Park Side Building
Address	5-8, Higashi Shinagawa 2-chome, Shinagawa-ku, Tokyo
Completion	January 1995
Total floor area	45,183㎡

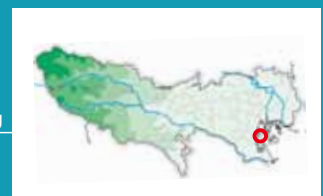
The Tennozu Park Side Building is owned by Sumitomo Bakelite and Nomura Real Estate Office Fund. Sumitomo Bakelite uses its floors as headquarters. Nomura Real Estate Asset Management has been entrusted to operate the equity share in the building owned by Nomura Real Estate Office Fund, assuming a role of ensuring dividends for investors. Nomura Real Estate Partners is in charge of the building management.



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Tennozu Park Side Building

5-8, Higashi Shinagawa 2-chome, Shinagawa-ku, Tokyo



With the support from top management, Canon Marketing Japan achieved further energy saving

Energy Saving with Wisdom, Passion, and Operation

Energy saving involves costs - Canon Marketing Japan took on this notion head-on. Using wisdom and operational measures, the company drastically reduced energy consumption at the headquarters that used to be an up-to-date energy efficient building at the time of completion. The driving force that made this possible was the support from top management and collaboration with a building management company.



Takeshi Yamataka, Canon Business Support (right)
Kazuaki Ito, Obayashi Facilities (centre)
Kiichi Asami, Obayashi Facilities (left)

The graph illustrates the transition of the primary energy consumption intensity at the Canon Marketing Japan Headquarters, namely the Canon S Tower building. The reduction ratio reaches as much as 43.6% in 2011 compared with the 2004 base year. Completed in 2003, the building featured an optimal illuminance system, high-performance heat reflective glass and other latest technologies, which made it a state-of-the-art energy saving building at that time. Additional energy saving was realized in spite of this fact.

The energy consumption significantly decreased in 2008, 2009 and 2011 when the Great East Japan Earthquake occurred but has slightly increased in recent years. These changes may reflect changes in the company's way of addressing energy saving and levels of difficulty it experienced.

Staff's cooperation triggered by top management's strong support

"There were two key factors that facilitated our energy saving activities," explained Takeshi Yamataka, Chief, Facility Management Operations Group, Facility Management Services, Canon Business Support, a group company of Canon Marketing Japan. "One is the CEO's support and the other is the collaboration with a building management company."

Canon Business Support officially started working on the energy saving project in 2008. The energy intensity had slightly increased in the previous summer mainly due to extreme heat, which was beyond their control, but the increase was not allowed to be left unsolved. In addition, the Tokyo Metropolitan Environmental Security Ordinance was revised to mandate CO2 reductions by

covered facilities.

"I am sure that the ordinance revision drove us to tackle energy saving," said Yamataka. "We had a hard time, but we were able to build energy efficiency expertise."

How did Canon Business Support promote energy saving? What they attempted was energy saving through operational measures without spending money. "We decided to do anything we could do and save energy with cost-efficient operational measures," said Yamataka. "General Affairs took cost cutting for granted and everybody thought that way."

Without the broad cooperation of employees, energy saving depending on operational measures cannot happen. They asked the CEO of Canon Marketing Japan for support and he met the request. The then CEO Masami Kawasaki emailed all employees to encourage energy saving activities, which proved to be very effective.

Another key factor was Obayashi Facilities, a building management company. "We have a repository of

expertise for building energy saving, from which we made some suggestions," said Kazuaki Ito, General Building Custodial Service, Obayashi Facilities.

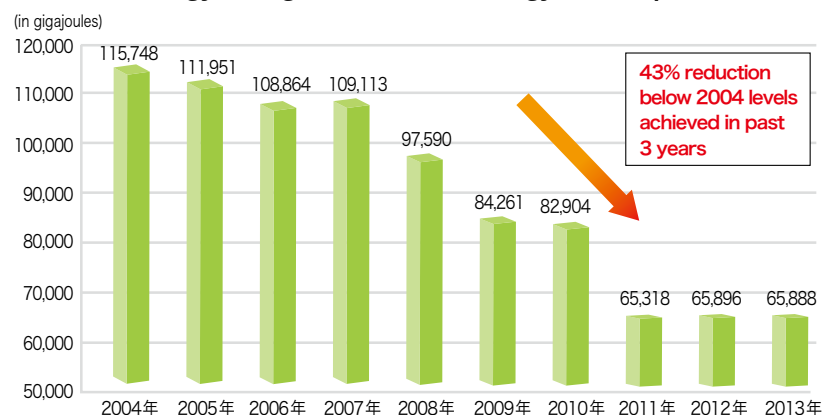
The cost-conscious, operational-measures-oriented energy saving project was started by collaborating with a building management company that has a rich array of energy efficiency ideas.

Piloted at General Affairs first, then expanding into all floors

The Canon S Tower has steam and cold water supplied by a district heating and cooling company. The range of energy saving applicable within the building was limited to lighting, air conditioning (partly), elevators, escalators and bathrooms. Therefore, a variety of ideas were tried and applied, part of which is described below.

The building has had half of its energy efficient HF fluorescent lights removed.

Effects of energy saving – transition of energy consumption



Illuminance in rooms has been reduced from 750 lux to 500 lux. All the lights are now turned off during lunch breaks (except busy floors) and after business hours.

Air conditioning is no longer turned on in hallways and elevator lobbies. These common areas are not crowded and moderate heat does not greatly affect people there. Temperatures in office space are limited to 28°C in summer and 22°C in winter in principle.

In summer, air-conditioning in the early morning is effective for controlling demand. Before business hours start when there are few people and the outside air does not flow in easily, even mild air-conditioning cools rooms efficiently.

“You get nothing if you don’t try,” said Yamataka. “We repeated the trial-and-error process until we made it.”

When an idea for energy saving was proposed, it was first tried at the General Affairs Department on the 25th floor. The room temperatures were increased or decreased, for example, to watch employees’ reaction. If there was no problem, the provisional step was applied to the floors immediately above and below, before finally being applied across the building.

Energy saving with patience does not last long. Combine it with repair plan for further reductions

Energy consumption was even more drastically reduced after the Great East Japan Earthquake with employees’ voluntary cooperation: “darker lighting is still acceptable.” A visualization system, the first investment in the energy saving project, served to raise employees’ awareness.

The project also made a remarkable contribution to financial savings at the company, helping achieve approximately JPY 230 million of cost reductions from the date of completion to 2012.

However, there remains a problem—employees have gradually become tired of saving energy. The challenge is to juggle a comfortable office environment and energy saving.

“We were successful in saving energy,” said Yamataka. “But if energy saving requires patience from employees, it will not last long. There is a limit to energy saving depending on operational measures. We are considering combining it with building repair plans to introduce energy efficient equipment, such as LED lighting.

By using wisdom first and hardware second, this way of saving energy lives up to expectations.



Building name	Canon Marketing Japan Headquarters (Shinagawa S Tower)
Address	16-6, Konan 2-chome, Minato-ku, Tokyo
Number of stories	29 stories above ground and 4 below
Total floor area	59,448.9㎡
Application	Office, showroom, etc.
Completion	April 2003



Central monitoring system

The system for monitoring energy across the whole headquarters building was only able to identify power consumption in three blocks: upper, middle and lower floors. In January 2011, a visualization system was introduced. Power monitors were installed in office space on the 10th to 26th floors to allow all employees to watch data on the server from their PCs. This has improved employees’ awareness of energy efficiency and encouraged full-participation energy saving. The system also shows the energy consumption ranking of floors.



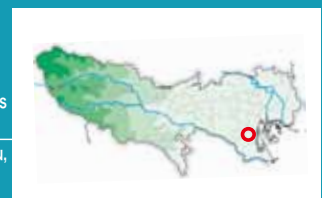
Attachment of insulation jackets

In the basement of the building, steam and cold water piping is installed for air conditioning. The steam piping was covered by insulation at the time of the building completion but the valves were exposed, significantly raising the room temperature. The valves have now also been covered by insulation jackets to prevent wasteful heat dissipation, reducing energy loss and an undesirable temperature rise.



Diagonal passing at entrance

There are two pairs of automatic doors at the building entrance. Both the inside and outside doors of one pair open but the inside door of the other pair is kept closed. People passing through the outside door of the latter pair have to walk diagonally to the inside door of the former pair. This is an idea for preventing air from easily flowing into and out of the building. Chibagin Mitsui Building.



Canon Marketing Japan Headquarters
(Shinagawa S Tower)
16-6, Konan 2-chome, Minato-ku,
Tokyo

TMG and facilities working together on the environment, still contributing to economic growth admirable low-carbon city

Rules for New Low-Carbon Economy

Policies implemented in Tokyo where economic functions are concentrated will be pioneering and advanced initiatives. With their significance in both quality and quantity, approaches taken by the megacity have potential to lead the world in the future.

Toru Morotomi, Professor, Kyoto University

Environmental issues and economic growth have long been considered to be in conflict with each other. That means working on environmental issues has a negative impact on economic growth.

The transition to the way of thinking that they are not incompatible started in Germany and other countries in the 1970s. Following extended arguments, a rough consensus of their compatibility was formed in the 1980s. Such attitudes were enhanced when inter-industry analysis clarified that investment in environmental measures can actually bring benefits to the entire industrial world. We are living in an age that no longer imposes a choice between the environment and economy but balances thought for the environment and the development of economy.

Early advocate of environmental measures

In Tokyo in the 1970s, there was strong public opinion that called for alleviation of serious environmental degradation, such as air pollution and water contamination. I think during that time infrastructure, organizations and human resources started to prepare themselves for the coming environmental policies. After pollution problems were mitigated, new problems emerged: vehicle emissions, energy efficiency in buildings and climate change.

I heard that since the age of pollution, the Tokyo Metropolitan Government has emphasized communication, helping officials talk with business operators to

seek the best strategies before the implementation of environmental measures. We can say TMG has built up tangible assets while overcoming environmental problems and intangible assets specific to the city, i.e. valuable efforts continued through dialog with facilities.

Creating a new economic system

TMG's programme consists of rules for creating a new low-carbon economy but they are not inflexible regulations. To create a new economic system, the administration has to have mental and physical strength in addition to firm and robust initiatives. I think it is TMG's consistent strong will and zeal that has enabled it to have excellent human resources.

The success of the programme depends on facilities' attitude and capability, and Japanese companies have met this challenge with their outstanding ability. Some of them have even outperformed reduction targets. This demonstrates the high awareness of and ingenuity in GHG reductions run through not only the construction industry that has provided the world's first-class energy efficient buildings but also businesses involved in the management and operation of buildings.

It is obvious that Tokyo's tackling of environmental problems has a huge influence over the Japanese and world economy. The success of approaches taken by a single city is barely seen throughout the world, and Tokyo will be an invaluable



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Specializing in environmental
economics and finance. Ph. D in
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of Government. Author of award-
winning books (in Japanese), including
Theory and Practice of Environmental
Tax (awarded by Japan Society of
Research and Information on Public
and Co-operative Economy and
Japan Association of Local Public
Finance) and New Strategies for Local
Regeneration (awarded by Public
Policy Studies Association Japan).

model case. I hope TMG will continue achieving concrete results in environmental measures as well as economic performance to raise its position among cities around the world.

Communicating TMG's efforts in environmental problems to the world

As the Tokyo Cap-and-Trade Program has proved to be effective, similar programmes have been started in several countries. On the other hand, there are countries that have brought about massive environmental contamination even though they have gained great economic success. To improve the situation, Tokyo has to communicate its efforts beyond the language barrier.

TMG's marvelous commitment should not be owned by one country but be shared around the world, although compliance not a big issue in Tokyo cannot sometimes be easily applied in other cities.

Programme for small and medium facilities

Environmental measures at small to medium sized facilities not covered by regulatory programme

Reporting Programme to Enhance Energy Saving

In FY2010, the Tokyo Metropolitan Government launched the Carbon Reduction Reporting Program for small and medium facilities that were not covered by the Tokyo Cap-and-Trade Program. Since the commencement of the programme, facilities submitting the report have steadily reduced CO₂ emissions.

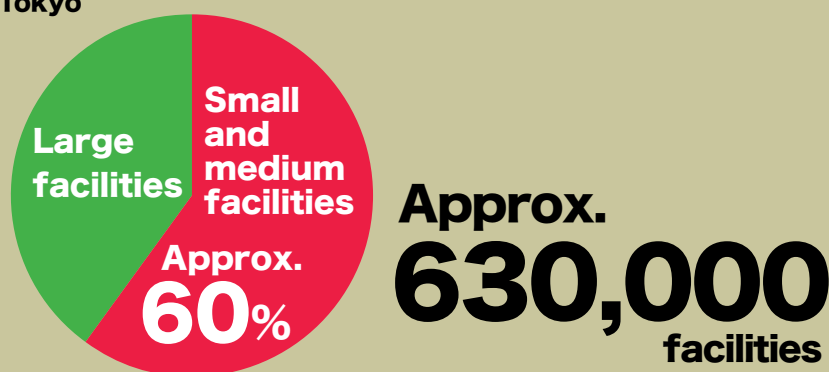
630,000 small and medium facilities in Tokyo

Facilities whose annual energy consumption is less than 1,500 kL of crude oil equivalent are treated as small and medium facilities, and there are around 630,000 such facilities in Tokyo. These facilities are not covered by the Tokyo Cap-and-Trade Program with no mandatory reduction targets imposed. However, CO₂ emissions from these facilities account for approximately 60% of those from the entire industrial and commercial sectors. Therefore, enhancing energy efficiency at these facilities is the key to reducing CO₂ emissions in the industrial and commercial sectors.

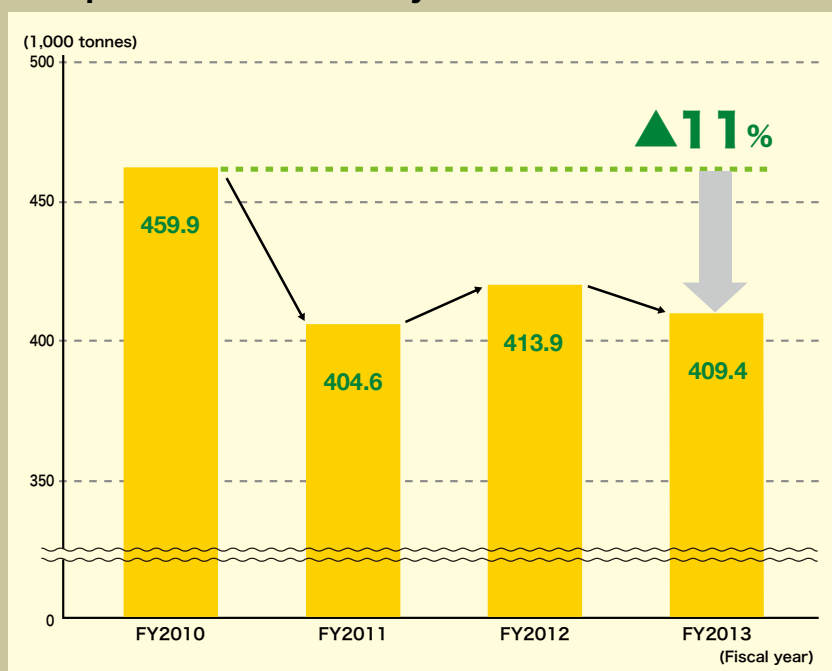
Energy saving rooted in reporting facilities

CO₂ emissions from reporting facilities are responsible for as much as around 1/3 of those from all small and medium facilities in Tokyo. Aggregating and analyzing data reported from these facilities provides a better understanding of the actual conditions at small to medium sized facilities. Total CO₂ emissions in FY2013 from facilities that submitted the report in the prior four consecutive years decreased by 11% from FY2010 preceding the Great East Japan Earthquake. This reduction ratio is almost the same as that in FY2011 immediately after the earthquake when emissions were greatly reduced with exhausting energy saving. This indicates that the reporting programme has motivated these facilities to continue energy and power saving.

CO₂ emissions share in industrial and commercial sectors in Tokyo



Transition of CO₂ emissions at 25,579 facilities that submitted the report in four consecutive years



Examples of small and medium facilities



Leased office buildings in Minato-ku



Retail stores in Taito-ku



University facilities in Shinjuku-ku

Understanding status quo to implement effective measures

Carbon Reduction Reporting Program

When single entities are compared, CO₂ emissions from each small or medium facility are much smaller than those from each large facility. However, the number of small to medium sized facilities in Tokyo amounts to as many as 630,000, which means that these facilities are the key to reducing CO₂ emissions in both the industrial and commercial sectors. The Tokyo Metropolitan Government has been encouraging energy saving at these facilities by means of the reporting programme.

Purpose and significance of the reporting programme

Reduction Reporting Program that covers all small and medium facilities in Tokyo. The purpose of the programme is to help these facilities identify their CO₂ emissions by drafting the report, implement tangible measures and enhance climate change countermeasures.

Small to medium sized facilities can save energy bills by committing themselves to energy saving measures through the reporting programme. These facilities can also improve their corporate image by positively carrying out the measures as their reports are disclosed on the TMG website.

As part of various systems to support enterprises combating climate change, we apply assistance measures, including the Energy Saving Promotion scheme, to reporting facilities.

Two submission types: mandatory and voluntary

The reporting programme covers all small and medium facilities of any business type or application in Tokyo, including offices, leased buildings, stores, medical facilities and factories.

Mandatory report submission is applied to business operators owning or using multiple small and medium facilities in Tokyo whose combined total annual energy consumption is greater than or equal to 3,000 kL* of crude oil equivalent. Other business operators may also submit the report at their discretion.

The number of enterprises that

submitted the mandatory or voluntary report in FY2014 exceeded 2,200, approximately 1.5 times the number at the start of the reporting programme. In particular, there is a remarkable increase in the number of voluntarily reporting enterprises, indicating the prevalence and endorsement of the programme.

* Facilities with annual energy consumption less than 30 kL of crude oil equivalent are excluded from the calculation that determines submission type, mandatory or voluntary.

Menus of energy saving measures friendly to beginners

Facilities are requested to fill out the report with CO₂ emissions and the progress of energy saving measures in the previous fiscal year along with other information. We offer 255 systematic menus of energy saving measures to be taken at facilities so that even beginners can select a menu that matches their business type to easily work on energy efficiency.

For menus needing extensive efforts, energy saving measures are divided into three levels to allow step-by-step approaches depending on the progress at facilities.

Providing feedback on information gathered through the programme

For business operators with small to medium sized facilities in the city, we hold the Climate Change Countermeasures Seminar to announce the aggregation and analysis results of data reported by the operators and energy saving best

practices achieved by the reporting operators.

By providing effective feedback on information accumulated through the reporting programme, we are raising covered facilities' awareness and encouraging them to improve energy saving measures.

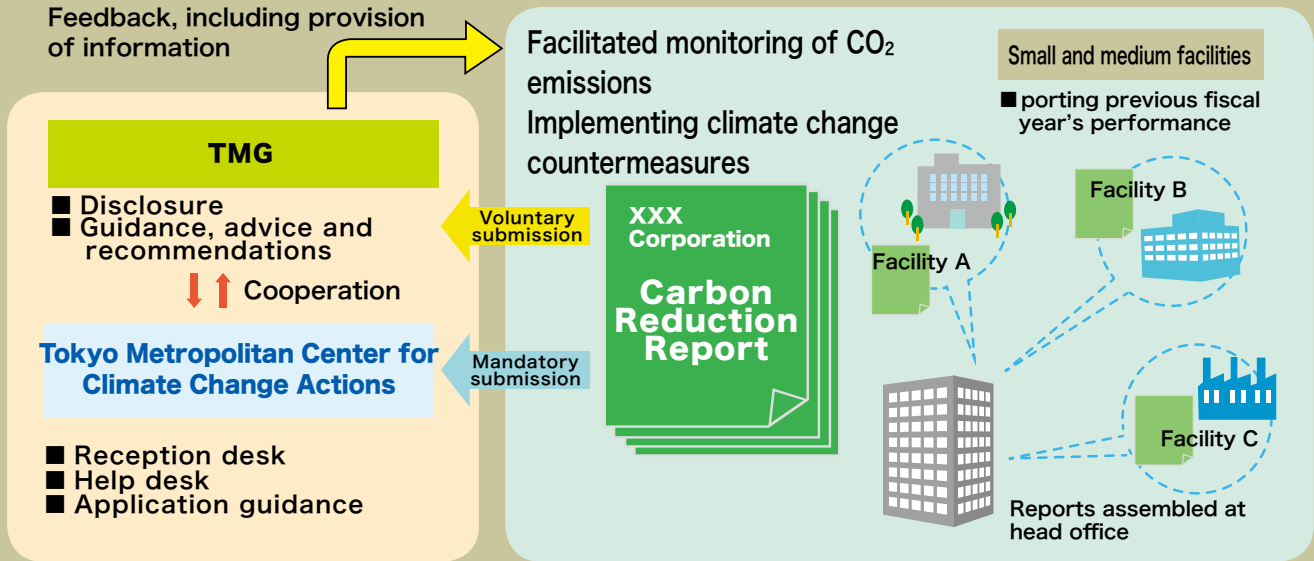
Posting achievements and goals at facilities' premises

In June 2014, the Tokyo Metropolitan Government started providing the PR Sheet on Climate Change Actions, which enables reporting enterprises to display their progress in energy saving measures at their entrance or other prominent places.

The enterprises can clearly show employees or visitors their efforts by posting CO₂ emissions reductions from the previous year and reduction targets in the current year.

Schematic view of Carbon Reduction Reporting Program for Small and Medium Facilities

Dealing with Carbon Reduction Reporting Program



PR Sheet on Climate Change Actions



Mandatory and voluntary submission

Annual energy consumption in crude oil equivalent

Mandatory submission

3,000kL or more in total

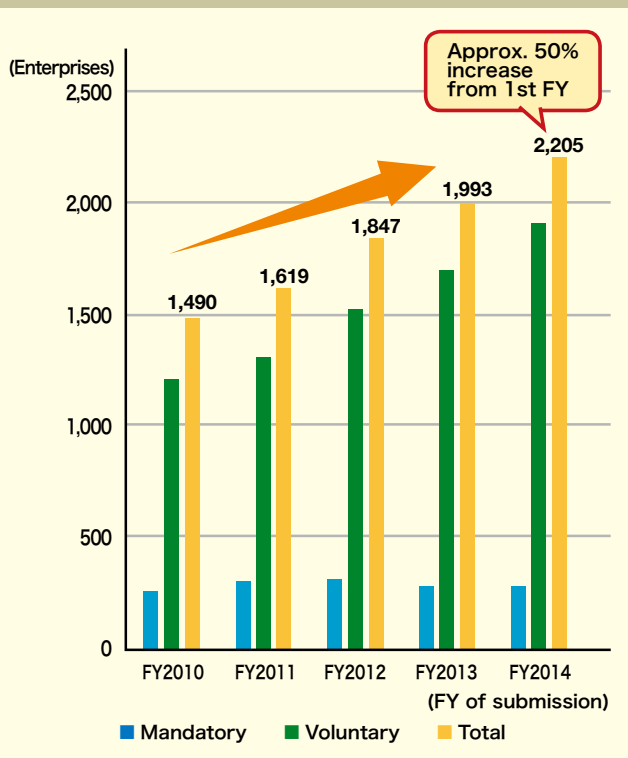
Voluntary submission

Under 3,000 kL in total

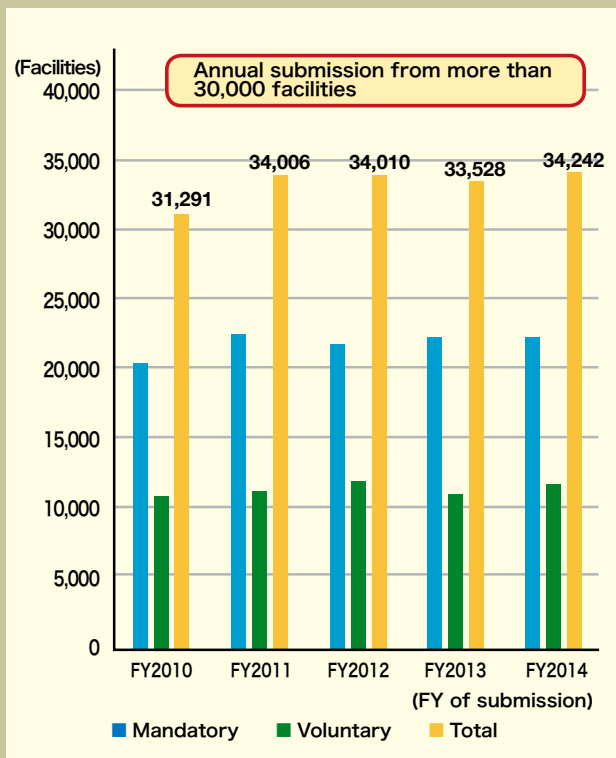


Mandatory report submission is applied to business operators owning or using multiple small and medium facilities in Tokyo and whose combined total annual energy consumption is greater than or equal to 3,000 kL* of crude oil equivalent. Other business operators may also submit the report at their discretion.

Transition of number of reporting enterprises



Transition of number of reporting facilities



Low Carbon Benchmark and Carbon Report Program visualize CO₂ emissions

On the Path to Low Carbon Society

The Tokyo Metropolitan Government has introduced the Low Carbon Benchmark based on reported data and the Carbon Report Program for small and medium leased buildings. By disseminating these schemes, we are aiming for a society that values low-carbon buildings in the real estate market.

Low Carbon Benchmark: self-rated index for CO₂ emissions levels

Based on data from submitted reports, we identified the distribution of CO₂ emissions intensity (CO₂ emissions per 1 m² floor area) for each business type and announced the Low Carbon Benchmark that classifies CO₂ emissions into seven levels (A1 to C) and 15 ranges (subdivision of level).

The 15 ranges consist of A1, A2, A3 and A4 (A1 to A3 are subdivided) in descending order below average CO₂emissions intensity in each business type and B2, B1 and C (B2 is subdivided) in ascending order above the average intensity.

The Low Carbon Benchmark allows the self-rating of CO₂ emissions levels at each facility to promote energy saving measures for better ranges.

Available with diverse business types and size

The Low Carbon Benchmark categories include 30 business types: office, leased building, store, restaurant, school, etc. There are two business types for leased buildings according to application, and each business type is divided according to size, enabling the comparison between buildings with the same application and size.

Importance of leased building measures

The aggregation and analysis of reported data shows that offices and

commercial facilities are responsible for approximately 70% of CO₂ emissions from small to medium sized facilities in Tokyo. The majority of offices consist of leased buildings, and the majority of commercial facilities consist of tenant stores, which implies the importance of leased building measures.

The cost of energy efficiency retrofits at small and medium leased buildings is usually paid by building owners. However, it is often the case that tenants gain the benefit of lower energy expenses and building owners feel that they receive less benefit, which may hinder energy efficiency improvements.

Energy saving and carbon reduction programmes at small and medium leased buildings

To make energy efficiency improvements at leased buildings beneficial to owners as well, the Carbon Report Program was introduced. June 2014, we started providing the Carbon Report form that clearly shows energy saving levels at small and medium leased buildings based on the Low Carbon Benchmark.

Building owners can appeal their energy saving levels to prospective tenants and encourage them to move in by indicating in the Carbon Report their buildings' benchmark data and the progress in energy saving measures at the buildings. The Carbon Report will help more energy efficient buildings be chosen, serve to improve their

occupancy rate for more stable profit and eventually bring further incentive for building owners to work on energy efficiency retrofits.

Carbon Report benefiting tenants as well

When selecting a building in the past, prospective tenants were not able to easily obtain information, such as environmental performance and the progress in energy saving measures at buildings.

With the Carbon Report available as reference for building selection, prospective tenants can now estimate after-occupancy energy bills based on the Low Carbon Benchmark and compare buildings' running costs before the final decision.

Project to visualize effects of energy efficiency retrofits

To support small to medium sized business operators with small and medium leased buildings that are planning energy efficiency retrofits, the Tokyo Metropolitan Government grants subsidies to cover part of the retrofitting costs on the condition of improvements in the Low Carbon Benchmark and submission of performance data after the retrofits. This is a two-year project from FY2014 to FY2015.

We are aiming to let energy efficiency retrofits infiltrate many small and medium leased buildings in Tokyo by analyzing energy data before and after the retrofits to visualize their effects.

Low Carbon Benchmark

The benchmark is CO₂ emissions intensity per 1 m² floor area (kg-CO₂/m²) obtained by dividing annual CO₂ emissions by total floor area. It allows self-rating of the deviation from an average CO₂ emissions intensity in a specific business type.

Category: Leased building (office use, medium-sized)

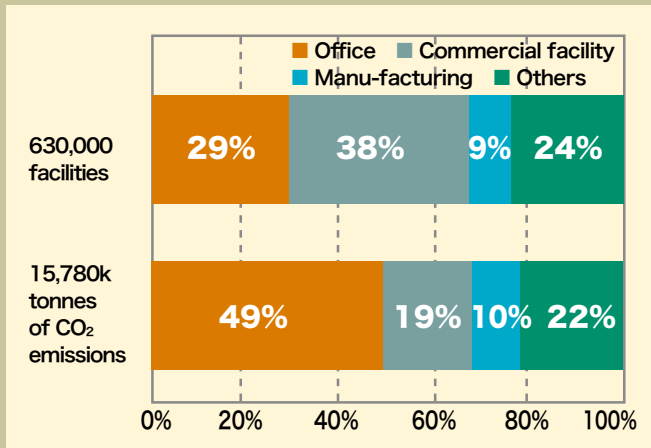
Range	Factor relative to average	Range of CO ₂ emissions intensity (kg-CO ₂ /m ²)	No. of facilities	% of facilities	Average TFA (m ²)	
A4	0.55 or less	32.9 or less	46	6.0%	5530	
A3 +	More than 0.55 to 0.60 or less	More than 32.9 to 35.9 or less	19	10.1%	4823	
A3	More than 0.60 to 0.65 or less	More than 35.9 to 38.9 or less	28		5718	
A3 -	More than 0.65 to 0.70 or less	More than 38.9 to 41.8 or less	30		5657	
A2 +	More than 0.70 to 0.75 or less	More than 41.8 to 44.8 or less	36	17.0%	5117	
A2	More than 0.75 to 0.80 or less	More than 44.8 to 47.8 or less	50		6048	
A2 -	More than 0.80 to 0.85 or less	More than 47.8 to 50.8 or less	44		5242	
A1 +	More than 0.85 to 0.90 or less	More than 50.8 to 53.8 or less	69	23.1%	5424	
A1	More than 0.90 to 0.95 or less	More than 53.8 to 56.8 or less	62		5855	
A1 -	More than 0.95 to 1.00 or less	More than 56.8 to average 59.7 or less	45		5195	
B2 +	More than 1.00 to 1.05 or less	More than average 59.7 to 62.7 or less	55	19.0%	5864	
B2	More than 1.05 to 1.10 or less	More than 62.7 to 65.7 or less	54		5822	
B2 -	More than 1.10 to 1.15 or less	More than 65.7 to 68.7 or less	36		6088	
B1	More than 1.15 to 1.50 or less	More than 68.7 to 89.6 or less	123	16.1%	5519	
C	More than 1.50	More than 89.6	66	8.7%	5835	
Note: Benchmarks for other 29 business types are also available.			Total	763	Average	5616

Benchmark categories for 30 business types

Category No.	Benchmark category	Category No.	Benchmark category
1	Office (tenant area)	14	Eating establishment (hamburger)
2	Office (corporate)	15	Eating establishment (coffee)
3	Leased building (office, small-sized) ¹	16	Eating establishment (Korean barbecue)
3	Leased building (office, small-sized) ²	17	Eating establishment (Chinese)
3	Leased building (office, small-sized) ³	18	Eating establishment (others)
4	Leased building (commercial complex, small-sized) ¹	19	Accommodation
4	Leased building (commercial complex, medium-sized) ²	20	School/educational institutions
4	Leased building (commercial complex, semi-large-sized) ³	21	Hospital/clinic
5	Store (convenience)	22	Health centre
6	Store (drug)	23	Long-term care health facility/nursing home
7	Store (grocery/department)	24	Fitness facility
8	Store (fresh food)	25	Pachinko parlor
9	Store (food manufacturing/retailing)	26	Karaoke room
10	Store (accessory)	27	Game arcade
11	Store (car retailing)	28	Library
12	Eating establishment (restaurant)	29	Museum
13	Eating establishment (pub/bar)	30	Municipal office

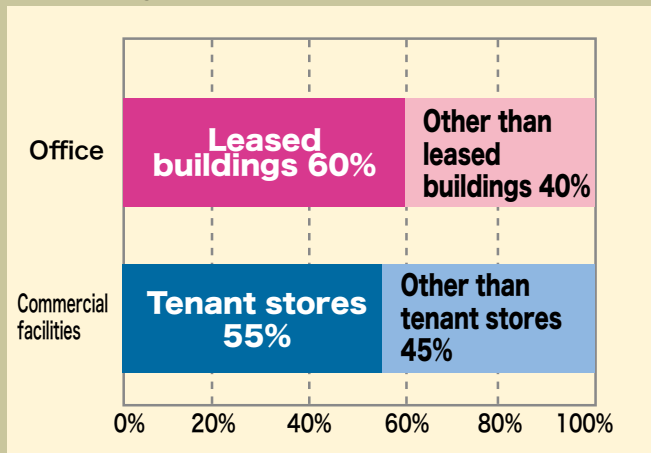
¹ Total floor area from 1,000 m² to less than 3,000 m²
² Total floor area from 3,000 m² to less than 10,000 m²
³ Total floor area from 10,000 m² to less than 20,000 m²

Breakdown of small and medium facilities and CO₂ emissions shares



Note: Figures are estimates based on performance data from reports in FY2010.

Application breakdown of facilities under mandatory submission



Note: Figures are estimates based on performance data from reports in FY2010.

Carbon Report

Carbon Report
 Actual Energy Performance of Low-Carbon Buildings in Tokyo

No. A0000-0001

Entity name: ○○○○株式会社
 Facility name: ○○○○ビルディング
 Address: 東京都港区○○○-1-1

Fiscal year	Annual CO ₂ emissions	Total floor area	CO ₂ emissions intensity	Main application
2013	450t	10000 m ²	45.0 kg-CO ₂ /m ²	Office

Benchmark category: Medium leased building for offices

Benchmark Range	Range of CO ₂ emissions intensity (kg-CO ₂ /m ²)
A4	Less than 32.9
A3+	32.9 to 35.9
A3	35.9 to 38.9
A3-	38.9 to 41.8
A2+	41.8 to 44.8
A2	44.8 to 47.8
A2-	47.8 to 50.8
A1+	50.8 to 53.8
A1	53.8 to 56.8
A1-	56.8 to 59.7
B2+	59.7 to 62.7
B2	62.7 to 65.7
B2-	65.7 to 68.7
B1	68.7 to 89.6
C	More than 89.6

Reported value: 45.0 kg-CO₂/m² (A2)

Tokyo Metropolitan Center for Climate Change Actions supporting energy saving activities

Outreach Efforts for Improving Energy Efficiency

To encourage energy saving measures at approximately 630,000 small and medium facilities in the city, the Tokyo Metropolitan Government has established the Tokyo Metropolitan Center for Climate Change Actions (known as Cool Net Tokyo). Using the centre as a hub, we are implementing various energy saving support programmes, including free energy audits and energy efficiency training.

Auditing facilities and proposing energy saving measures without charge

The energy audits are services for small and medium sized facilities, which officially started in FY2008, with more than 2,700 facilities audited in total so far. Specialists of energy saving actually visit facilities, examine energy saving measures suitable for their actual conditions and propose specific energy efficiency measures. The specialists also provide an audit report tailored for each facility, which describes in detail the procedures for implementing the measures and the cost effectiveness of the implementation.

At the request of audited facilities, we will dispatch a specialist again to provide more practical services based on the audit results. The services this time are intended to help implement energy saving measures, or operational improvements now, which are readily available and need no expenditure.

The average CO₂ reduction ratio at facilities that have gone through the energy audits is 17.9%, more than double the baseline 8.2% seen at facilities without the audits. This clearly proves the efficacy of the energy audits.

Dispatching lecturers for free to energy efficiency training

For broad dissemination of energy saving measures, the Tokyo Metropolitan Government dispatches experienced lecturers free-of-charge to energy

efficiency training held by municipalities or industry associations.

Having joined around 220 training courses and other sessions, our lecturers describe the benefits of energy efficiency and a concrete way of promoting measures in a comprehensive manner so that novice participants can understand the contents.

To communicate more practical energy saving measures for specific business types, we have offered energy efficiency textbooks for each business type by working with industry associations. Textbooks for more than 26 business types, including leased buildings, have been made available so far.

Tax incentives encouraging introduction of energy efficient equipment

In FY2009, the Tokyo Metropolitan Government launched a programme that exempts small and medium facilities from the corporation or individual enterprise tax when they introduce energy efficient equipment specified by TMG.

We have specified more than 40,000 equipment models for air conditioning, lighting, hot water and renewable energy. The specified equipment models can be retrieved by manufacturer name or model number at the website of the Bureau of Environment, Tokyo Metropolitan Government.

Outline of the Tokyo Metropolitan Center for Climate Change Actions



Symbol

The centre is also known as Cool Net Tokyo, which means a network for preventing climate change. Its symbol represents Tokyo acting as one of the building blocks to prevent climate change. The tip of the cap symbolizes the Tokyo Skytree tower.

Help desk and rental services

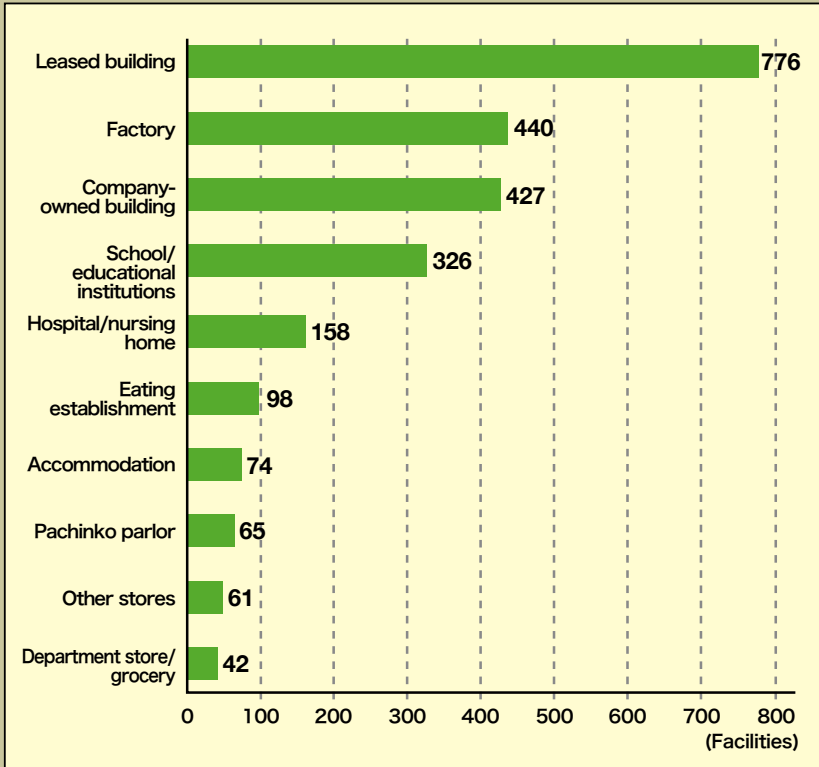
The centre provides a help desk to answer questions about the prevention of climate change and energy saving measures. It also rents environmental learning tools, such as DVDs featuring climate change countermeasures, and measuring instruments useful for saving energy.

Public relations with events and exhibitions

By holding events and exhibitions to introduce the status quo of climate change and case examples of energy saving practices, Cool Net Tokyo supports energy saving activities promoted by people and businesses in Tokyo.

Energy audit breakdown by business type

for top 10 business types from FY2008 to FY2014



Energy efficiency textbooks by business type

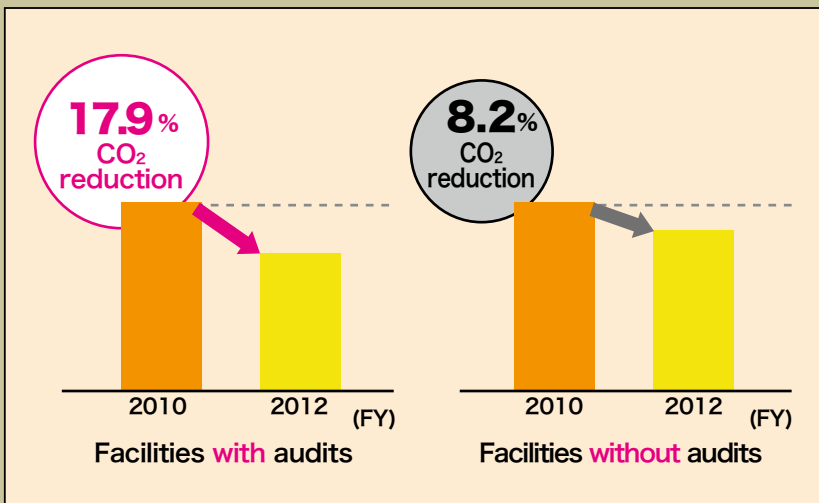


List of 26 business types

1	Warehouse, including freezer and refrigeration storage
2	Energy visualization equipment
3	Leased building
4	Public bath
5	Movie theatre
6	Karaoke room
7	Grocery store
8	Office
9	Petrol station
10	Confectionery factory
11	Convenience store
12	Entertainment facility
13	School facility
14	Hotel
15	Painting
16	Nursing home
17	Beauty salon
18	Fitness club
19	Recycling
20	Hospital
21	Plating factory
22	Cleaning
23	Glossing
24	Noodle making
25	Printing
26	Eating establishment

CO₂ reductions achieved through energy audits

Energy saving measures recommended by specialists provide larger CO₂ reductions.



Note: The CO₂ reduction ratios are calculated based on the Carbon Reduction Report.

Cool Net Tokyo



The centre has a help desk in TMG No. 2 Building.

Free energy audits



Facility equipment is checked to propose tailored energy saving measures.

Energy efficiency training



Lecturers are dispatched to training or sessions held by municipalities or industry associations.

Operators' awareness and eagerness maximizing equipment power

Green Building Driven by Leading-edge Technologies

It is the people who operate hardware that have the potential to maximize its performance and capability. All energy saving strategies at the Alps Electric headquarters building are converged on operators' awareness and eagerness.

Contracted capacity of 677 kW for total area of 21,000 m²

Not all facilities can necessarily be successful in saving energy even if sophisticated equipment is introduced. This is the reason why energy saving is challenging. The evolution of energy efficiency depends on the operation of hardware as the case example of the Alps Electric headquarters building proves in this article.

"The contracted capacity of around 830 kW at the time of its completion has decreased every year to 677 kW now," explained Masataka Yamaguchi, Manager, Environment, General Affairs, Administration Headquarters, Alps Electric. The total floor area of the building is 20,929 m² and it has a server room. The contracted capacity is considerably low in spite of these conditions. How have they decreased it to this level?

"The key was enjoying trivial matters," answered Yamaguchi. Their success seems to have greatly depended on individual efforts of employees.

Completed in 2010, the building has adopted an all-electric system driven by the belief: "In case of an earthquake, electricity allows for the fastest restoration of the infrastructure." The building has obtained the highest "S" rank certification in CASBEE (Comprehensive Assessment System for Building Environmental Efficiency), which evaluates buildings' environmental performance quality. The introduction of the all-electric system was determined in the planning process with a designer from the construction company. Top management puts emphasis on absorbing the most advanced measures and supports the plan, with the attitude of "Try anything first. Gain experience." This way of thinking is seen everywhere in the company. For example, LED illumination has been used in some meeting rooms while their basic lighting is HF fluorescent lights. They dared to introduce LED although it was expensive and not as energy efficient as it is now. A more complicated challenge has been its color rendering properties.

BEMS has come to be widely used at many facilities, but no one could tell how effective it was at that time. However, "this level of energy saving has never been possible without BEMS," said Yamaguchi. What has changed?

Identifying challenges and taking measures before remodeling

Energy is controlled by a central control unit and BEMS. The basics of heat source equipment operation are volume control. Air conditioning is provided by turbo refrigerators, HP module chillers and water thermal storage tanks as well as air conditioning equipment. In summer, the turbo refrigerators are operated with night-time power to make cold water, which is retained in the 1000-m³ water thermal storage tanks. In the daytime, the cold air is supplied across the whole building for air conditioning. When air conditioning load is high, the HP module chillers are operated to compensate for any insufficiency. The HP module chillers are also used to make hot water for heating in winter.

Natural ventilation has also been adopted. During mild periods outside of summer and winter, the wind often blows from south to north in the area in which the building is located. There are slits on



Masataka Yamaguchi, Alps Electric

the south side of the building to let the wind easily flow in.

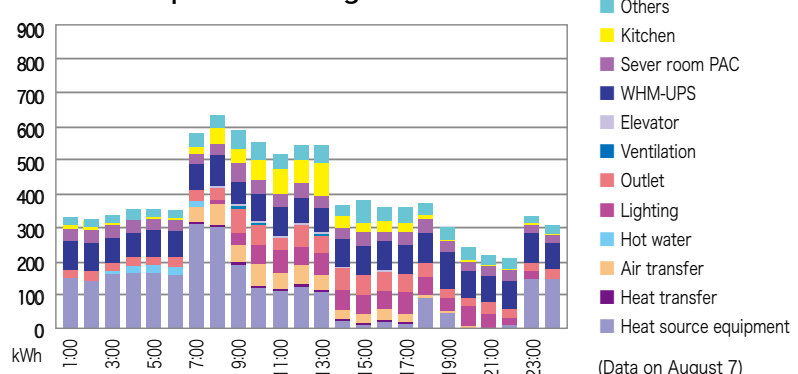
The central control unit is loaded with the company's calendar information, including business days and holidays. It controls power supplies for air conditioning, automatic vending machines, lighting and water heaters in tune with the conditions of the building operation.

Each floor is equipped with a security card reader, which turns off air conditioning and lighting when the last employee activates the security system before leaving the office. The readers were integrated into the building when it was constructed as a way to deal with the challenge of staff leaving something on.

Operators fine-tuning the operation depending on varying load

The story continues to BEMS. Why can their BEMS maintain the contracted capacity at that low level? Because they are committed to peak shaving. During peak hours of 1 to 4 PM in summer, the HP module chillers are stopped and only the cold heat stored during night-time is used to deal with air conditioning load.

Electrical energy data analysis of BEMS at Alps Electric headquarters building



When air conditioning is turned on, the load is distributed by sequential activation. However, their commitment does not end here.

In addition to watching a variety of data maintained in the BEMS, operators every day consider the next day's weather report and estimated room temperatures to adjust the activation times of air conditioning in units of 10 minutes. This is just one example of their routine.

"Our operators have to have the motivation and awareness for these jobs," said Yamaguchi. "Visualization helps them have the motivation and awareness. It is hard for operators to watch a lot of numerical information every day. We have to help them do that easily and precisely. We also have to visualize their activities so that we can support them while working."

Challenges remaining in server room responsible for 40% of power consumption

There are cost-conscious ways of saving energy, such as, for example, saving water used during toilet flushing. They used to use rain water for that purpose but came up with an idea of using the large amount of air conditioning drainage. Eventually, they made it available for greenery as well by simply installing branch piping.

In summer, magnets are used to attach plastic cardboards to the sunny windows of meeting rooms. This alone reduces room temperatures by 1 or 2°C with an expenditure of several hundred yen for each piece of cardboard, according to the company.

The energy saving committee discusses information on and suggestions for energy efficiency. However, most employees can only be involved in limited energy saving measures, such as reducing illumination. This causes the promotion of energy efficiency to depend on the ability of a specialist team in which Yamaguchi takes part.

What results have been achieved? On the whole, power consumption has been increasing except for a 3.3% reduction in 2014 compared with 2010. The main cause of the increase is the server room, which accounts for 40% of power consumption. An increase in the number of servers has outpaced the energy saving measures taken for the server room. Drastic countermeasures are required to make a breakthrough in this area.

Having tackled various aspects in energy efficiency, Alps Electric also underwent the free energy audits by the Tokyo Metropolitan Government to receive a fair evaluation by a third party. Its employees were most impressed by advice on the temperature settings for refrigerators in the kitchen. They were recommended to set higher temperatures on holidays when the refrigerators are kept closed. There still seem to be energy efficiency improvement opportunities, which will lead to continuous energy saving activities.



Building name	Alps Building
Address	1-7, Yukigaya-otsukamachi, Ota-ku, Tokyo
Number of stories	7 stories above ground and 1 below
Total floor area	20929m ²
Application	Office
Completion	March 2010

The building has obtained the highest "S" rank certification in CASBEE, which evaluates buildings' environmental performance. Its efforts to improve environmental quality and performance include natural lighting, subdividing zones for lighting and air conditioning and rooftop gardening. Its approaches to mitigate environmental impacts include controlling thermal load with Low-E glass, use of natural energy (reduced illuminance, use of rain water, natural ventilation), EcoCute (hot water supply system using a heat pump) and energy management with BEMS.



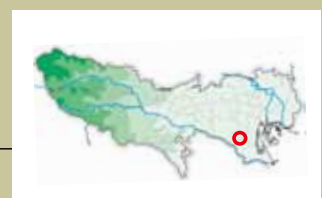
There are two sets of seven HP module chillers on the roof. By combining these chillers and the turbo refrigerators, volume control is carried out in response to air conditioning load. The operation giving priority to thermal storage levels electrical load (peak shaving) to maintain the contracted capacity under 677 kW, which has reduced basic charges.



Underfloor air conditioning

Underfloor air conditioning, using a space of approximately 30-cm under the floor, provides heating and cooling in the building. Employees in the office feel comfortable with radiation from the air-conditioned floor according to the company's officials.

Alps Building
1-7, Yukigaya-otsukamachi,
Ota-ku, Tokyo



Green Building Program

An Environmentally-Conscious Plan for New Buildings

Buildings must have proper energy saving measures implemented upon construction and alteration to maintain, for several decades following their construction, the energy efficiency planned at the design stage. The Tokyo Metropolitan Government has been promoting environmental consciousness by introducing various programmes for new buildings, ranging from those built in a large-scale urban development to office buildings and condominiums.

Encouraging green building plans

For large buildings with total floor area more than 5,000 m² constructed in the city, the Tokyo Metropolitan Government requires building owners to ensure environmentally conscious design in accordance with its guidelines and submit a Green Building Plan, which contains the design considerations and evaluations, 30 days before a building permit application *1 or earlier. Voluntary submission is accepted for buildings with total floor area from 2,000 m² up to 5,000 m².

In the traditional building design in Japan, the building itself and electrical and mechanical equipment in it were generally designed by different designers with different specialties. However, since the introduction of the Green Building Program, building designers have come to review its environmental performance from the planning stage and building equipment designers have become involved in the early stages of overall design.

Outlines of the submitted plans are disclosed on TMG's website for the purpose of requesting voluntary efforts for the environment from building owners and creating a market that values environmentally conscious buildings with high quality.

Since 2002 when the programme was launched, the plans have been prepared and disclosed for more than 2,600

buildings.

*1 Before starting construction, building owners are required to submit an application that confirms the plan's compliance with the building standards requirements and to receive a building confirmation certificate.

Reducing environmental impacts of new buildings

The programme requests building owners to aggressively work on four areas: "Rational use of energy," "Proper use of resources," "Environmental conservation" and "Mitigating heat-island effect." Subject to TMG's evaluation standards, building owners are striving to reduce environmental impacts due to buildings through three-grade evaluations in the four areas.

In particular, regarding "Heat load resistance of building shell (PAL* or PALSTAR *2)" and "Energy performance of shell and equipment (ERR *3)" in the "Rational use of energy" area, building owners use the energy saving

calculation specified by the national Energy Conservation Law *4 to complete the three-grade evaluations based on reductions from the national energy saving standards.

For owners of large buildings with total floor area more than 10,000 m², the Energy Performance Standards have been developed to mandate energy saving measures over a certain level.

2 Perimeter annual load, which is an index related to the prevention of heat loss through building exterior walls, windows, etc. The former PAL was revised to PAL (PALSTAR) in 2014.

*3 Energy reduction ratio, which is an index related to the reduction ratio of energy used in facility systems. In 2013, the calculation was revised to one that is based on primary energy consumption.

*4 Law Concerning the Rational Use of Energy

Buildings covered by Green Building Program

Voluntary submission	Mandatory submission	
Specified buildings greater than or equal to 2,000m ²	Specified large buildings greater than 5,000m ²	Specified extra-large buildings greater than 10,000m ² • Energy Performance Standards • Energy Performance Targets (for specific development businesses only) • Energy Performance Certificates
When the plan is submitted: • Consider introduction of renewable energy based equipment. • Comply with Green Labelling Program for Condominiums (including rental apartments)		

Mandatory submission is applied to buildings constructed or extended with total floor area greater than 10,000 m² (5,000 m² in October 2010 and beyond)

Voluntary submission is applied to buildings constructed or extended with total floor area from 2,000 m² up to 5,000 m² (in October 2010 and beyond)

Programme for new buildings

Features of Green Building Program

By requiring owners who build large buildings to submit a Green Building Plan, this programme encourages their voluntary approaches to the environment at the architectural planning stage. The Tokyo Metropolitan Government discloses the outlines of the plan with an aim to form a market that appreciates environmentally conscious buildings with high quality.

Programme features

Evaluation

Building owners evaluate their own eco-friendly approaches based on TMG's guidelines.

Guidance

TMG encourages building owners' voluntary efforts in a facilitating manner.

Four features

Disclosure

TMG discloses building owners' eco-friendly efforts on its website.

Confirmation

TMG confirms results of eco-friendly efforts by asking building owners to submit them upon completion of construction.

Issuance of Energy Performance Certificates

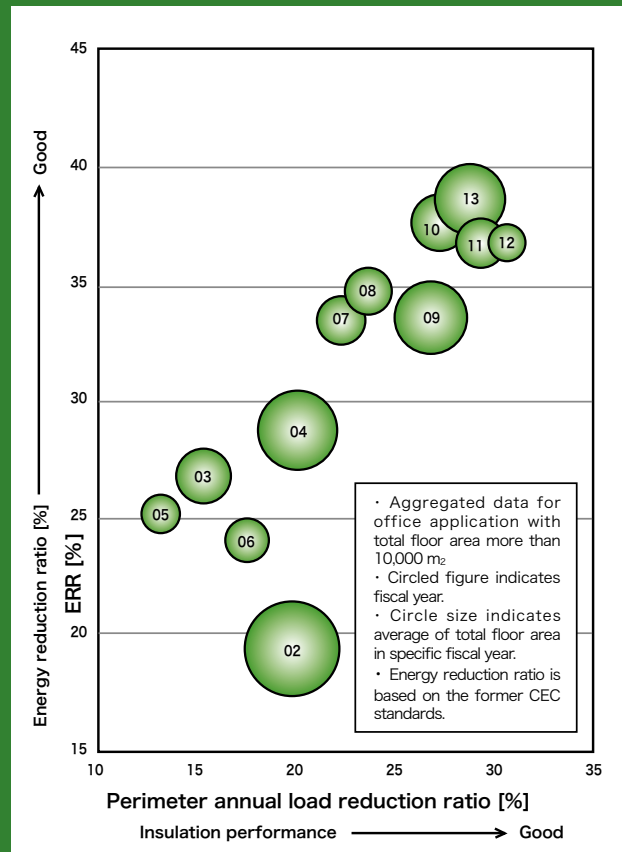
Owners of large commercial buildings with total floor area greater than 10,000 m² are required to not only submit a Green Building Plan but also issue an Energy Performance Certificate to potential building buyers or tenants upon real estate transactions. Through such procedures, we will create a real-estate market that values environmental performance of buildings.



Assessed categories/items

Rational use of energy	Heat load resistance of building shell
	Use of renewable energy
	Energy performance of shell and equipment
	Efficient operation
Proper use of resources	Use of eco-materials
	Ozone layer protection and climate change mitigation
	Longer building life expectancy
Environmental conservation	Hydrological cycle
	Greening (vegetation, landscaping, etc.) and biological diversity
Mitigating heat-island effect	Measures against artificial exhaust heat from building equipment
	Covering ground and building surfaces
	Provision for wind environment

Environmental performance transition of non-residential buildings



Synergy through power of conversation, nature and equipment at Sengawa Kewport

Optimum Energy Efficiency in Huge Space of 6,000 m²

Walking along the Keio Line railroad tracks from the Sengawa Station, you will find an impressive, hexagonal five-storied building. It is the Sengawa Kewport built at the place where Kewpie's former Sengawa Plant used to be. The Sengawa Kewport is a complex that contains Kewpie's headquarters and group companies, consisting of 17 facilities: offices, research and development laboratories, visitor facilities and a childcare lounge. It is full of environmentally conscious ideas and energy efficient measures that are in harmony with the building's concepts.

Structure designed to trigger communication

The shape of the Sengawa Kewport does not aim for a unique design but intends to connect 17 offices, R&D laboratories, visitor facilities and a childcare lounge that have different characteristics. The building was constructed with a concept: a hub to stimulate communication between employees, change the way of working and create new value.

Kewpie suggested the concept to a design firm, Nikken Sekkei, which had its own concept for the building: a workplace that improves productivity, gives employees peace of mind and provides environmental-friendliness. Nikken Sekkei proposed a building with higher "migration," which would naturally encourage conversations while also being excellent in business continuity planning (BCP) as well as environmental consciousness. What is noteworthy is that these concepts remained firmly in place through the whole construction process.

The hexagonal design resulted from meeting the site conditions. The location was in an irregular shape surrounded by residential properties. The building height was limited by a municipal ordinance. In spite of all these unfavorable restrictions, necessary floor area had to be ensured. There was also an imperative goal on top of that, vitalizing communication between employees.

"The solution that cleared all the limitations was the hexagonal design and a huge area of 6,000 m² per story," said Takahashi, Nikken Sekkei.

The area of 6,000 m² is suitable for an open space that vitalizes communication. According to operational characteristics, the working area has been divided inside and outside the migratory hallways or encircling corridors built on the hexagonal floor. The inner area, where larger space is available, contains Sales and other departments, in which synergy is generated by collaboration between employees. On the other hand, the outer area involves departments handling confidential information, such as the Customer Service Office.



Sugiyama, Kewpie, Takahashi and Ozawa, Nikken Sekkei (from left to right)



Front view of Sengawa Kewport

Using sunshine to let the wind blow through the huge atrium

Nikken Sekkei has intentionally separated the office space onto the second and fourth floors and the R&D area onto the first and third floors.

"We attempted to provide casual encounters and conversations by promoting the migration between the upper and lower floors as well," said Takahashi.

The research and development area is covered with glass and can be seen through from the encircling corridor. This allows "conversations between eyes."

Top management showed basic policies alone and entrusted specific decisions to the employees, with the only condition that space for communication had to be ensured. The smaller working area offers a larger space where people gather and talk.

At the same time, environmental measures and BCP operation were deliberated.

The Sengawa Kewport has a huge atrium at the centre of the hexagon for natural lighting, which also acts as a wind path for natural ventilation.

Then, where does the wind come in? It comes through six light courts located along the encircling corridors. The wind

enters the building at natural ventilation windows around the light courts and passes through the second and fourth floors to the atrium, going up toward the roof. It should be noted that both the entrances and exits are opened upward.

"The size of the central atrium is more than 100 m², which allows enough sunlight to shine down on the inner walls," said Ozawa, Nikken Sekkei. "This warms up the air at the top, causing updraft. We have provided voids of different sizes to achieve two different functions: air supply and air release."

Tax incentives encouraging introduction of energy efficient equipment

In FY2009, the Tokyo Metropolitan Government launched a programme that exempts small and medium facilities from the corporation or individual enterprise tax when they introduce energy efficient equipment specified by TMG.

We have specified more than 40,000 equipment models for air conditioning, lighting, hot water and renewable energy. The specified equipment models can be retrieved by manufacturer name or model number at the website of the Bureau of Environment, Tokyo Metropolitan Government.

It is the enormous space of 6,000 m² that has enabled this mechanism. “We feel the wind when the natural ventilation windows are opened,” said Sugiyama, General Affairs, Kewpie. “Those who like the wind open the windows by themselves when coming to work in the morning.”

This has also been enabled by the clear concept.

Heat source equipment operating in various modes in different situations

Heat source equipment consists of gas cogeneration systems, absorption refrigerators, air cooled heat pump chillers and once-through boilers. The equipment is operated in a well thought-out and strategic manner, though it seems complicated as it contains a variety of machinery.

Kewpie is different from many other businesses that may deliberate on the use of an emergency power supply to be capable of BCP. The company wanted to make the most of a generator and use it as a normal power supply, too. Eventually, it introduced two cogeneration systems for two-level peak shaving at day and night as well as during summer and winter.

The research and development area accounts for around 60% of energy consumption in the building. Among other things, testing rooms with huge kitchens need a vast amount of ventilation for cooking, causing high thermal load. In addition, the R&D area has equipment operating 24/7. Under these conditions, they proactively determine the operating procedures for the heat source equipment to improve energy efficiency.

In summer, heat from the cogeneration systems is used first for air-conditioning. The exhaust heat is turned into steam or hot water to be supplied to the absorption refrigerators to make cold water. If capacity is not enough, turbo refrigerators are operated. If capacity is still insufficient, the absorption refrigerators are loaded with gas and air cooled heat pump chillers are operated. In winter, heat from the cogeneration systems is used first for hot water supply and heating. If capacity is not enough, once-through boilers are used for compensation. If air conditioning load occurs in the R&D area, air cooled heat pump chillers are used first.

Across the inner open areas on the second and fourth floors, underfloor air conditioning is used as it is suitable for large spaces. Ceiling air conditioning, which is convenient for partitioning, is used in the outer areas.

According to the company, a questionnaire issued to employees after the completion of the “comfortable and refreshing place to work” (Nakajima, Kewpie) showed that their satisfaction rating was over 90% on average. This proves that a building with true energy efficiency is comfortable for people working in it.

Higher energy efficiency and a more comfortable environment form a complementary partnership in this case example.



Top view of Sengawa Kewport (seen from above from the southeast)

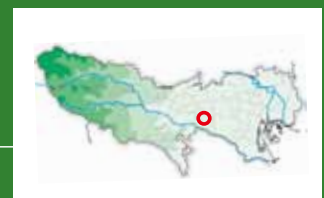
The building, with an impressive hexagonal design, has five stories above ground and one below. Each floor has an area of approximately 6,000 m². At over 100 m², the atrium can be seen at the centre, through which the wind blows out of the building. A major design challenge was avoiding a feeling of pressure as the building is surrounded by residential properties. There is a well in the premises, which has been providing potable and other daily use water since the days of the former Sengawa Plant.



Natural ventilation system: The wind blows in at the top of the light courts, passing through the second and fourth floors to the atrium. The sunlight shines down on the top of the walls around the atrium and causes updraft, providing a natural-energy driven ventilation system. The natural ventilation windows, which are automatically opened and closed depending on temperature and humidity, can also be manually operated. Mist is sometimes diffused toward the light courts to make inflowing air more comfortable.



Dining lounge on the second floor: Its illuminance is usually set lower than that in the office. However, acrylic panels on the coved ceiling give a brighter impression across the lounge. There are sensors on the ceiling, which are connected to the central monitoring room on the first floor. More specifically, the ceiling is equipped with motion sensors for adjustments depending on the presence/absence of humans and light sensors for illuminance control and time scheduling. Also, the lounge has incorporated underfloor air conditioning to avoid additional attachments to the ceiling for ensuring a simpler appearance.



Sengawa Kewport
5-7, Sengawa 2-chome,
Chofu-shi, Tokyo

New standards for selecting condominiums with less environmental impact

Green Labelling Program for Condominiums

To provide guidelines for consumers to select condominiums with less environmental load, condominium owners who have submitted a Green Building Plan are required to display an environmental performance label on any advertisement upon sale or lease.

Mandatory indication of covered condominiums' environmental performance

growing in Tokyo, energy saving measures in the domestic sector are becoming increasingly important. Among buildings covered by the Green Building Program, condominiums constitute a large share of CO₂ emissions. However, the Green Building Plan prepared by condominium owners may be rather complicated for general consumers as it requires expertise and contains technical terms.

In 2005, the Tokyo Metropolitan Government launched the Green Labelling Program for Condominiums to make condominiums' environmental performance understood at a glance by requiring owners to display the environmental performance label on any advertisement upon sale or lease. In 2008, the environmental performance display on advertisements became mandatory for rental condominiums as well. In 2010, the total floor area of covered condominiums was extended to more than 5,000 m², and at the same time, the voluntary submission programme started, which allowed condominiums with total floor area from 2,000 m² up to 5,000 m² to display the environmental performance.

The number of notifications made for the Green Labelling Program for Condominiums has been over 150 every year since more condominiums were

covered by the programme.

The programme goals

The programme has been designed to:

- (1) Help potential purchasers or tenants select eco-friendly condominiums by providing them with appropriate information.
- (2) Create a mechanism that allows eco-friendly condominiums to be valued in the market.
- (3) Encourage condominium owners to make environmentally-conscious efforts on a voluntary basis.

Through the achievement of these goals, we are aiming to popularize condominiums with higher energy efficiency and smaller environmental impacts.

Label contents and display procedures

Condominiums focuses on five items: "Building insulation," "Equipment energy efficiency," "Solar power generation/heating," "Longer building life expectancy" and "Greenery." In accordance with the Tokyo Green Building Guidelines, owners of covered condominiums show self-rated results on the five items in advertising, including newspaper inserts, brochures and web advertising with floor plans. The programme also requires model rooms and real-estate offices to describe the label contents to prospective buyers or tenants.

The labelling programme has steadily made owners more aware of environmental performance during condominium development.

The Green Labelling Program for Condominiums started by the Tokyo Metropolitan Government has caused adjacent municipalities to apply similar schemes.

Improvements in environmental performance

At the time of the programme's start, less than 30% of covered properties achieved the highest rating of three stars for the "Building insulation" and "Equipment energy efficiency" items. The proportion has now increased to around 90%.

Introduction of solar power generation

The "Solar power generation/heating" item was added in January 2010 to help check for the availability of solar power generation systems when selecting condominiums.

In the several years following the programme's launch, the adoption rate of solar power generation has been limited to approximately 10%. It has increased to 30% or 40% in non-residential buildings, condominiums and other properties



Tsukuda Jima, Chuo-ku



Mita, Meguro-ku

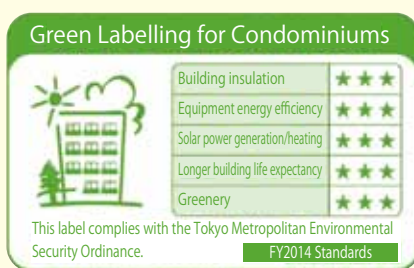


Konan, Minato-ku



Kachidoki, Chuo-ku

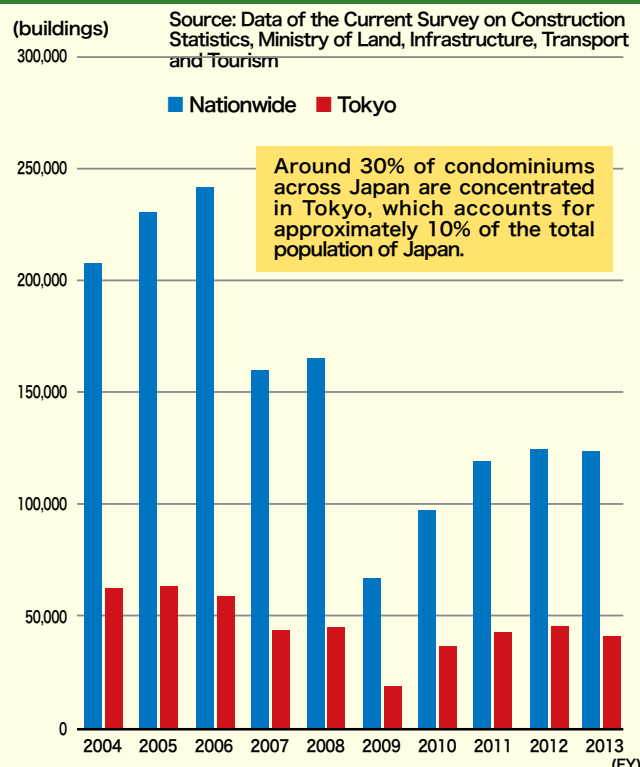
Green Labelling for Condominiums



Five evaluation items in Green Labelling for Condominiums

Item	Description
Building insulation	Evaluates building energy efficiency achieved through improvements in the insulation of exterior walls, roofs and windows.
Equipment energy efficiency	Evaluates energy efficiency of existing equipment for hot water supply, floor heating and air conditioning that consumes a large amount of energy.
Solar power generation/heating	Evaluates the sizes of the relevant equipment.
Longer building life expectancy	Evaluates the ease of piping maintenance and countermeasures for building degradation.
Greenery	Evaluates quality and quantity of greenery in the premises.

New housing starts of condominiums in Tokyo (comparison with national levels)



Note: The statistics cover collective housing as construction method and steel frame reinforced concrete, reinforced concrete and steel frame as structure. Hence, they include condominiums not covered by the Green Labelling for Condominiums

Urban Planning Systems and District Energy Planning System for Effective Utilization

Environmental Measures in Urban Development

To maintain high-quality urban space that is compatible with individual district characteristics, the Tokyo Metropolitan Government is promoting further improvements in well-balanced urban functions through a variety of urban development programmes. We are aiming to make Tokyo a city with less environmental impact by taking advantage of urban development opportunities to integrate environmental measures into the early stages in the development planning process.

Promoting CO₂ reductions in parallel with Urban Planning Systems

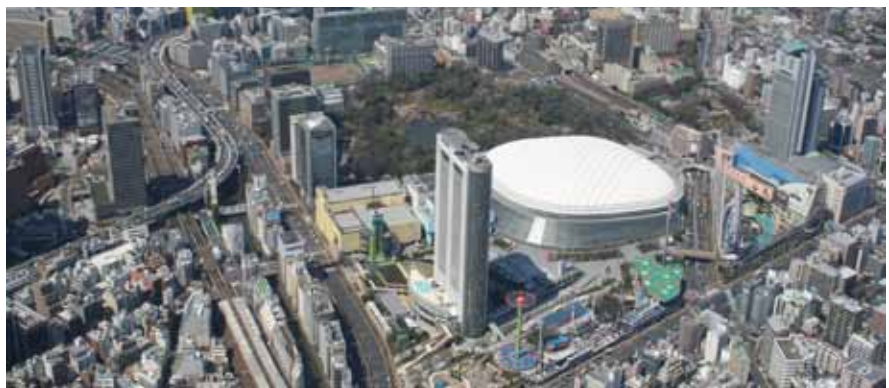
For the purpose of translating a future vision of each district into reality, we are renovating the city through the strategic use of four programmes: "Specified blocks," "District plans that define areas for the promotion of redevelopment, etc.," "High-level use districts" and "Integrated design system" (collectively referred to as "Urban Planning Systems"). Upon application of the Urban Planning Systems, we comply with their guidelines to encourage efforts that contribute to reduced environmental impact.

CO₂ reductions are one such effort. We request step-by-step enhancement of CO₂ reduction measures from buildings constructed using the Urban Planning Systems, by setting two criteria-evaluation standards and target levels-based on the "Heat load resistance of building shell" and "Energy performance of shell and equipment" items in the Green Building Plan.

As mentioned above, the Tokyo Metropolitan Government has demonstrated leadership in improving environmental performance of new buildings in the city by requiring environmental measures over a certain level from those which use the Urban Planning Systems while helping them achieve higher environmental performance.

Special Urban Renaissance Districts

Special Urban Renaissance Districts are defined in Urban Renaissance



Area for District Cooling and Heating, Koraku 1-chome

Urgent Redevelopment Areas to introduce advanced infrastructure, strengthen international competitiveness and encourage planning with superior environmental performance. Having no guidelines as those for the Urban Planning Systems, this scheme solicits urban planning proposals that make the most of creative ideas of private businesses, bringing aggressive approaches for CO₂ reductions, such as the use of energy networks and introduction of cogeneration systems.

Promoting effective use of district energy

Urban development is actively underway mainly in the metropolitan area of Tokyo. For businesses implementing large-scale development, whose whole floor area, including all buildings, is greater than 50,000 m², the District Energy Planning System for Effective Utilization, launched in January 2010, requires action for an effective use of unexploited energy to be taken at an early stage in the planning process.

This system has been designed to make Tokyo an energy efficient and

low carbon city with less environmental load by using district energy. To be more precise, it requires developers, owners and/or other relevant parties to set energy saving targets at new buildings; consider the use of unused energy, including exhaust heat from air conditioning, and/or renewable energy, including solar power generation; and deliberate over the introduction of district heating and cooling.

Energy efficiency improvements at district heating and cooling facilities

may specify an area capable of efficient energy supply that meets certain criteria as an Area for District Cooling and Heating. Those who want to construct a new building over a certain size in the area are urged to consider the acceptance of heat supply and required to report the result to TMG.

Regional energy suppliers are required to submit an annual report on energy supply to TMG. Based on the report, we evaluate and disclose their energy efficiency to encourage more energy efficient operations.

Aiming for the World's Smartest Energy City with Low Carbon, Comfort and Disaster Prevention

The Tokyo Metropolitan Government strives to create a quality environment that ensures comfortable living through approaches to both the supply and demand of energy, including additional energy saving and the use of low carbon energy. To meet the target, we will develop and realize a broad range of programmes and mechanisms by listening to the voices of the citizens and businesses of Tokyo. We will never stop trying to be the world's smartest energy city, taking the initiative in the growth of Japan while developing in a sustainable manner.



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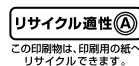
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