

On the Path to a Low Carbon City

Tokyo Climate Change Strategy



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International Environment Cooperation Section
Bureau of Environment
Tokyo Metropolitan Government
2-8-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo, JAPAN 163-8001

www.kankyo.metro.tokyo.jp/en/climate/
tokyoets@kankyo.metro.tokyo.jp



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1. Low-Carbon Cities: The Way of the Future

Cities: The Key to Tackling Climate Change

The role of cities in dealing with climate change is becoming increasingly important. Cities already account for 67% of global energy consumption and 71% of global energy-related carbon dioxide (CO₂) emissions*¹, and their share continues to grow. The urban population was half the global population in 2010 and is expected to reach 70% by 2050*². In short, the role of cities cannot be ignored because of their large and growing share of the world's energy consumption.

It is clear that the overall demand for energy in cities must be reduced. Cities contain a high concentration of buildings and facilities as well as the infrastructure for dynamic societies. Most energy produced is eventually consumed in cities. It is important, of course, to lower carbon footprints on the energy supply side—at power plants for instance—but it is also important to employ demand-side measures to reduce overall energy consumption. The reduction of final energy consumption is an important key to cutting greenhouse gas (GHG) emissions by half or more, a goal that many countries believe should be achieved by the end of this century.

*1 IEA (International Energy Agency), World Energy Outlook 2008
 *2 UN, World Urbanization Prospects: The 2007 Revision

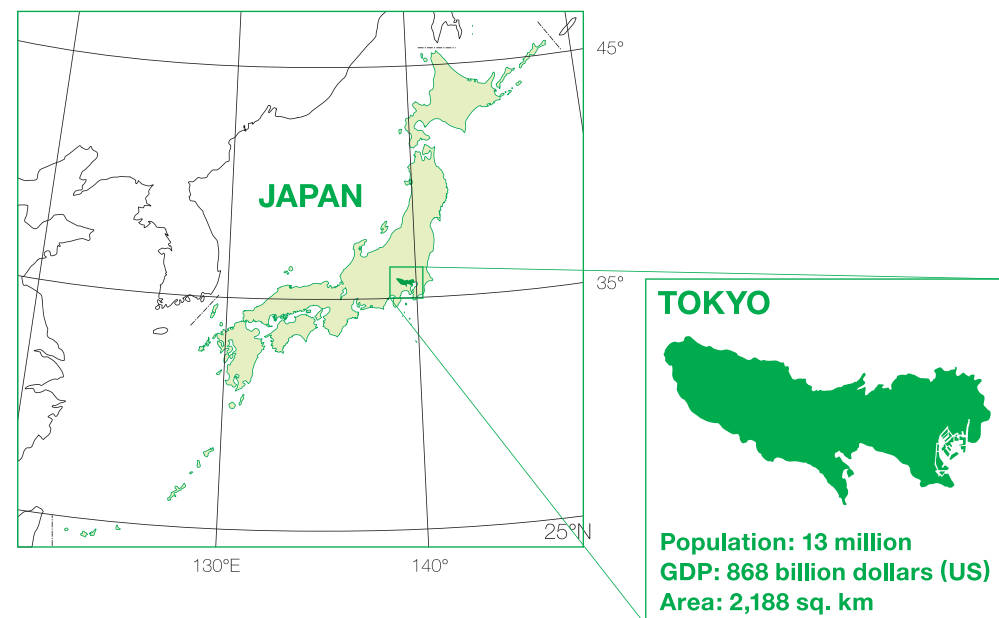


Fig. 1. Tokyo Facts

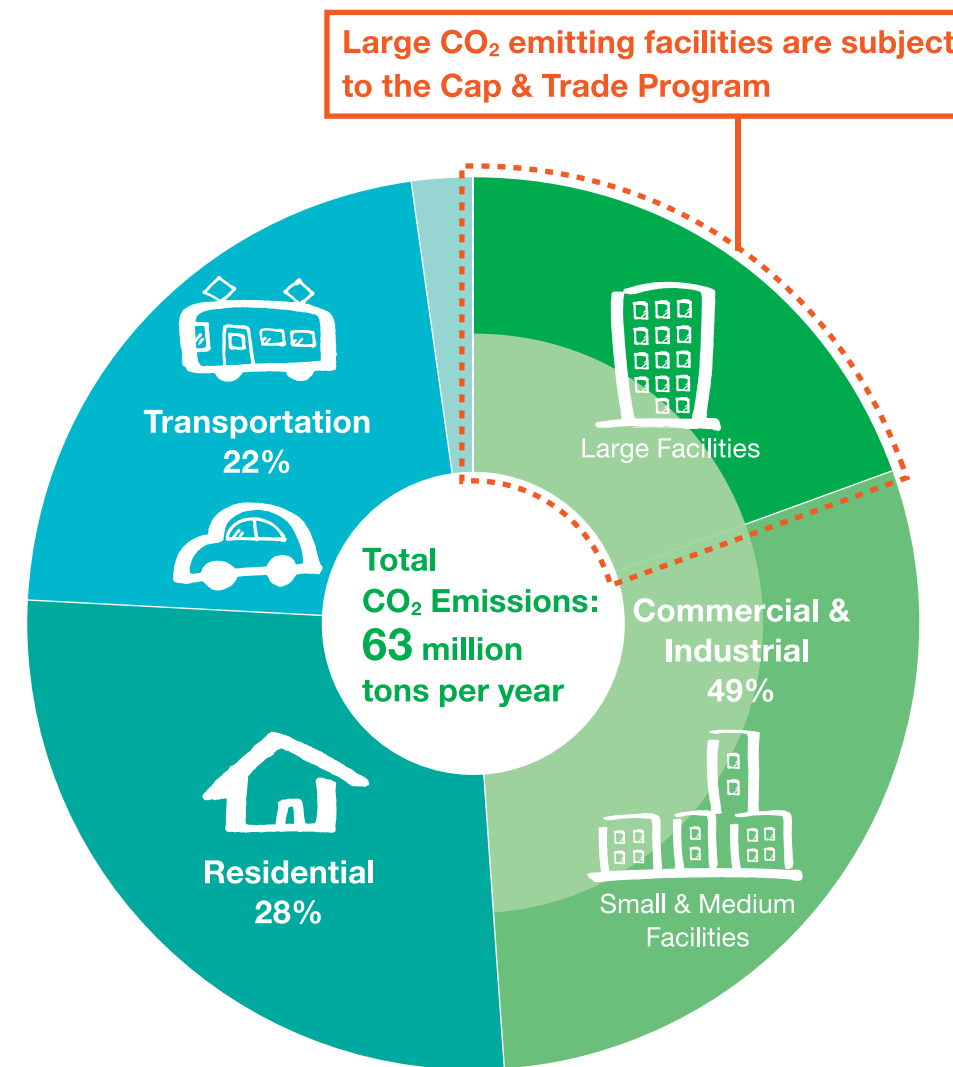


Fig. 2. Tokyo's CO₂ Emissions, by Sector (2008)

In policy implementation as well, cities and their governments must play a lead role in addressing climate change. Local and sub-national governments work closely with energy consumers, and have the capacity to manage various programs on a day-to-day basis. These efforts are therefore indispensable for developing and implementing effective climate-related measures. The actions and roles of governments at the city, local, and sub-national levels are more important than ever.

Responsibility and Opportunity

Tokyo aims to become a world leader as a low-carbon city by taking advantage of opportunities presented by the green economy. Tokyo is a megacity, with energy consumption resulting in annual GHG emissions of 65 million tons (annual CO₂ emissions 63 million tons; see Fig. 2), comparable to emissions from countries like Denmark and Sweden. Annual emissions and energy consumption in the Tokyo area have been more stable since the 1990s than in the 1970s and 1980s, but our responsibility as a large energy consumer is still significant.

Tokyo has been tackling climate change for more than a decade and has for many years been successfully controlling pollution. Confident in its vibrant economy and hard-working people, and aware of its responsibility and potential, Tokyo has adopted a vision to become one of the world's most dynamic and sustainable cities—socially, economically, and environmentally.

GHG Emission Reduction Target

As one important step toward our vision, in December 2006, the Tokyo Metropolitan Government (TMG) set the target of reducing its GHG emissions by 25% from the 2000 level by 2020. In 2007, TMG adopted the Tokyo Climate Change Strategy and the Tokyo Metropolitan Environmental Master Plan, marking major steps toward the achievement of this target. Since then, much effort has gone into developing and implementing programs to dramatically reduce carbon emissions.

Major Programs

TMG policies and programs have actively targeted climate change for more than a decade (Fig. 3). A significant early step was the enactment in 2000 of two major programs that created the basic framework for later program development. One—the CO₂ Emission Reduction Program (mandatory emission reporting)—helped stimulate emission reductions in large facilities, and currently it changed its target to small and medium-sized facilities. As a program for large facilities, TMG’s Cap-and-Trade Program was newly established. The other—the Tokyo Green Building Program for new buildings—introduced a rating and reporting system of buildings’ environmental performance, and has since then fostered sister programs such as the Green Labeling Program for Condominiums and the Energy Certificate Program.

Our approach with these programs is to ensure that any measures introduced are effective themselves and at the same time create a framework for the next stage. For example, the introduction of the Tokyo Cap-and-Trade Program for facilities with large CO₂ emissions was intended not only to reduce current CO₂ emissions at the targeted facilities, but also to set the

stage for future reductions at those facilities, and through emission trading, for potential cuts from a wider range of entities throughout Japan.

Combining Regulation and Market Mechanisms

A key characteristic of Tokyo’s programs is the combination of regulation with the use of market mechanisms. With the Cap-and-Trade Program, for instance, substantial emission reductions are ensured by the absolute caps on emissions from each sector and the requirement for individual facilities to reduce emissions. Meanwhile, the emission trading scheme with offset credits allows participants greater flexibility in choosing cost-effective measures by utilizing market mechanisms. The Green Building Program utilizes market mechanisms through its mandatory reporting and labeling scheme used to rate the environmental performance of buildings, but it also includes regulations on minimum energy standards.

Working with Stakeholders

Nongovernmental organizations (NGOs), representatives of industry, citizens, and experts have participated actively and played an important role in formulating and implementing TMG policies. The Climate Change Strategy requires the active participation of all sectors of the society, each in their respective roles. TMG has consistently encouraged discussion during the policy-making process, and then introduced and implemented bold and effective measures based on the input from all stakeholders.

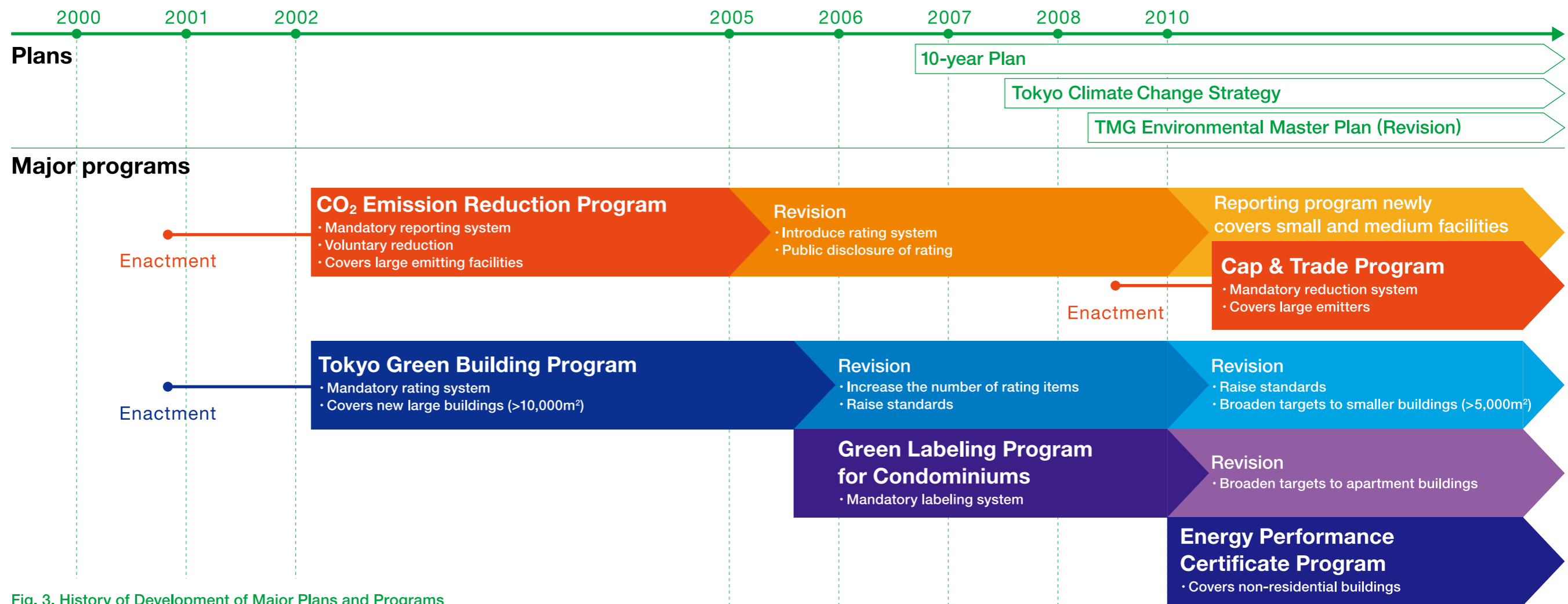
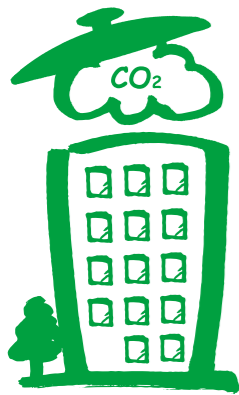


Fig. 3. History of Development of Major Plans and Programs

2. Cap-and-Trade Program



World's First Urban Cap-and-Trade Program

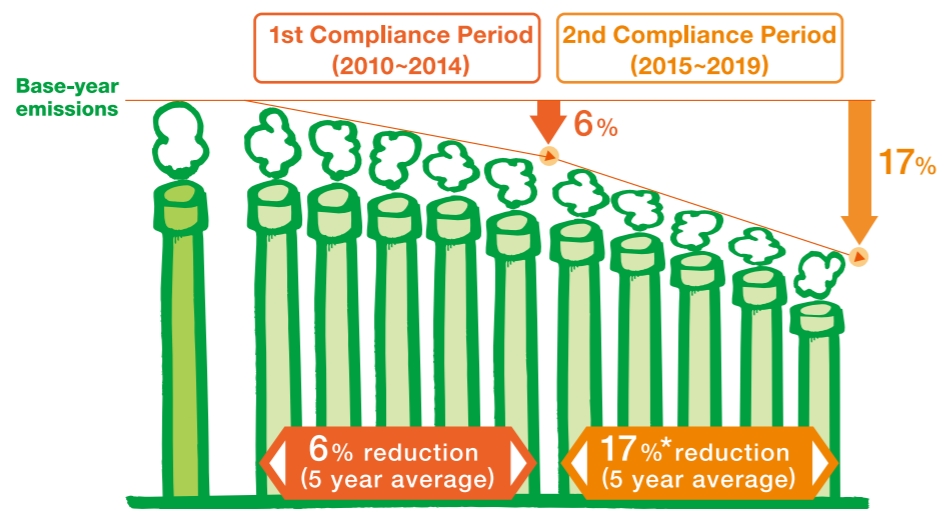
The Tokyo Cap-and-Trade Program, launched on April 1, 2010, is the world's first urban Cap-and-Trade program. Its aim is to reduce CO₂ emissions from urban facilities. Focusing on end users of energy, TMG set a cap at the city level on emissions from large commercial and industrial buildings. Owners of these buildings are required to meet their emission reduction targets through on-site energy efficiency measures or an emission trading scheme. This program is designed to lower the total emissions from large energy consuming facilities, while allowing them the flexibility to choose the most cost-effective methods.

Program Design

A unique feature of the Tokyo Cap-and-Trade Program is its targeting of office buildings and other buildings in the commercial sector. It covers large CO₂-emitting facilities that consume energy in the amount of more than 1,500 kiloliters (crude oil equivalent) per year. In effect, the program applies to about 1,300 facilities: in the commercial sector, about 1,000 office buildings, public buildings, and commercial facilities; in the industrial sector, about 300 factories and other facilities. The total emissions from targeted facilities account for 40% of all CO₂ emissions from the commercial and industrial sectors in the Tokyo area.

The total cap on the targeted sector was set 6% below base-year emissions for the first compliance period (2010–2014), based on Tokyo's emissions reduction goal for 2020. The cap for the second period (2015–2019) is expected to be a 17% reduction below base-year emissions, taking into account future technological innovations, expected market efficiencies, and planning for long-term investments (Fig. 4).

During the first period, targeted factories by 6% and office buildings with other facilities are required to reduce their total CO₂ emissions by 8%, from their base-year emissions. They are allowed to select the average of any three consecutive years from 2002 to 2007 as their own base year emissions, an approach that allows flexibility and fairness based on their differing business conditions. A facility that has already achieved high energy efficiency can be certified as a "Top Level Facility." For such a facility, the mandatory reduction target rate is reduced to half or three-quarters of the normal rate, depending on a detailed review.



★ This is current estimate. To be confirmed at the end of first compliance period

Fig. 4. Setting Emission Caps

To achieve their required reductions, in addition to the introduction of energy-efficiency measures and renewable energy at the targeted building site, each facility can purchase excess reductions from other facilities, as well as three types of offset credits (Table 1).

Facility owners that fail to meet their own emission reduction targets are required to cover 1.3 times the reduction shortfall, are subject to a fine of up to 500,000 yen, and will have their violation published.

Table 1. Design of Tokyo Cap-and-Trade Program

Items	Description
Facilities covered	1,300 large CO₂-emitting facilities in the Tokyo area that consume more than 1,500 kiloliters (crude oil equivalent) of energy annually <ul style="list-style-type: none"> • Individual facilities or buildings are the basic unit of emissions reduction obligations and emissions trading • In principle, responsibility for meeting obligations on facility owners
Gas covered	Energy-related CO ₂
Compliance periods	Two five-year periods (fiscal years) <ul style="list-style-type: none"> • First period: 2010 to 2014 • Second period: 2015 to 2019
Emission caps	6% reduction below base-year emissions (first compliance period) About 17% below base-year emissions (second compliance period)
Base-year emissions	Average emissions of three consecutive years between 2002 and 2007
Emission allowance	Base-year emissions × (1-compliance factor*) × 5 years * 6% for factories, 8% for office buildings and other facilities
Emission trading	Excess reductions (beyond compliance factor) are tradable after second year
Offsets (credits)	Three types of offset credits are currently permitted <ul style="list-style-type: none"> • Emission reductions from small and midsize facilities in Tokyo • Renewable energy credits • Emission reductions outside Tokyo area
Reporting, verification	Verified reporting is required every year based on TMG guidelines Verification agencies are registered by TMG governor.
Banking, borrowing	Banking to the second commitment period is permitted. Borrowing is not permitted.
Tenant obligations	Tenants are required to cooperate with emission reduction measures taken by building owners. Specified tenants using a large floor area or a large amount of electricity are required to submit their own emission reduction plans to TMG via the building owner, and to implement the plans.
Penalties	Fines, charges (up to 1.3 times the shortfall). Violation will be published.

The Tokyo CO₂ Emission Reduction Program: Building a Foundation for Cap and Trade

The Tokyo Cap-and-Trade Program did not emerge overnight. Its forerunner, the Tokyo CO₂ Emission Reduction Program, started in 2002 and revised in 2005, laid the groundwork for the Cap-and-Trade scheme (Fig.3). It required large facilities with large CO₂ emissions to report to TMG their CO₂ emission data and a three-year plan to reduce emissions. Emission reductions were voluntary, but the 2005 revision added a rating and web-based public reporting system that gave TMG more ability to issue guidance. For example, TMG was able to urge every facility to introduce basic energy-saving measures with payback periods of less than three years.

This mandatory reporting program made facility owners and managers more aware of their own energy performance

and the need for energy conservation. TMG prepared an energy efficiency diagnosis reports based on data received, showing each facility's performance, along with comparable and benchmark data, in each building use category. This kind of feedback has been effective in promoting emission reductions. This program also played a crucial role in the development of the Cap-and-Trade program by accumulating data and experience and building relationships with facility managers, particularly for the setting of fair and effective emission caps and allocating emission allowances.

Since 2010, the target of this program has shifted to small and medium facilities.

3 Tokyo Green Building Program

Promoting Greener New Developments

Every plan to construct a new large building (over 5,000 square meters in total floor area) within Tokyo is subject to the Tokyo Green Building Program. Every building owner covered by the program is required to employ environment-friendly design principles based on TMG guidelines. Before applying for a building permit, an applicant is required to submit a "Building Environmental Plan" outlining the proposed building's environmental performance. The owner must also submit a completion report soon after construction is complete. The plans, along with rated performance results, are then published on the TMG website.

Since 2002, more than 1,500 buildings have disclosed their "green specs" under this program, currently at the rate of about 300 buildings annually, accounting for about 30% of total floor area of buildings newly constructed in Tokyo each year.

Through its rating and reporting scheme, this program aims to create a real estate market in which "greener" buildings (with higher environmental performance) are valued more highly than less "green" buildings.

With the latest revision, effective in 2010, the program was enhanced with a focus on climate change mitigation and now includes regulatory standards for energy efficiency that are higher than the national standards. The revision also added the requirement of conducting a feasibility study for introducing renewable energy generation devices on-site.

Green Building Rating System

In the Tokyo Green Building Program, environmental performance is assessed by focusing on twelve items in the four categories (energy, resource, natural environment, and heat-island effect) (Table 2). Plans and designs for each item are to be described and a three-grade rating system are applied, using a standard form, together with supporting data.



Program Developments

In addition to enhancements to the Green Building Program itself, progress is being made in starting "sister programs" based on its rating system and information disclosure.

Green Labeling Program for Condominiums (since 2005)

Residential buildings account for a large proportion of the buildings subject to the Green Building Program, but consumers sometimes have difficulty in fully understanding and utilizing the information from the Green Building Program. Therefore, in 2005 a program was established requiring condominiums to display a "green label" showing their "green" ratings in sales and rental advertising materials (Fig. 5). In 2008, this program was revised to cover apartment buildings as well.

Energy Performance Certificate Program (since 2010)

A labeling system on energy performance for non-residential buildings also began in 2010. Building owners are required to present an energy performance certificate when conducting transactions and leasing (Fig. 6). This certification system also uses the reported data from the Green Building Program and increased the level of detail of ratings to a five-grade system.

Requirement of higher energy standards for large urban developments (since 2009)

Since construction of large-scale buildings in Tokyo often utilizes urban planning systems that include bonuses—such as increasing the permitted total floor area ratio to site area (FAR)—in the application of such urban-development systems, building environmental performance now must meet higher standards than usual developments.

Related to climate change, a rating of grade 2 or higher under the Green Building Program is required on the items of reducing building thermal load (insulation) and energy efficiency in equipment. Although this system was introduced only recently, it already appear to be having a significant effect in making buildings in Tokyo more energy efficient overall.

Table 2. Design of Tokyo Green Building Program

Items	Description	
Facilities covered	Newly planned large buildings over 5,000 square meters in total floor area	
Items assessed	Categories	Items
	Energy	Building thermal load (insulation) Renewable energy devices (on-site renewables) Energy-efficiency systems (building equipments) Building energy management systems
	Resources, materials	Use of eco-friendly materials, ban on the use of fluorocarbons, longer building life, water recycling
	Natural environment	Greening, landscaping, bio-diversity, water conservation
	Heat-island effect	Heat emissions, ground surface cover, wind environment
Rating	Each item is rated using three rating grades (1-3)	
Reporting, disclosure	Environmental plan and rating results must be reported before applying for a building permit. Ratings are displayed with charts on TMG website.	

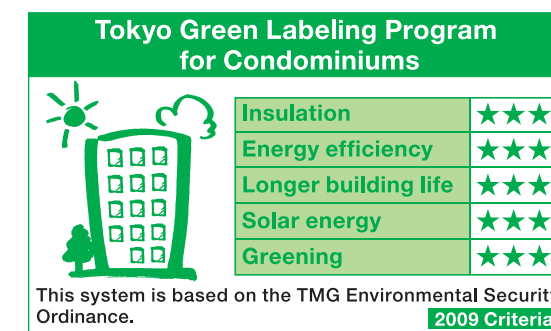


Fig. 5. Green Labeling Program for Condominiums

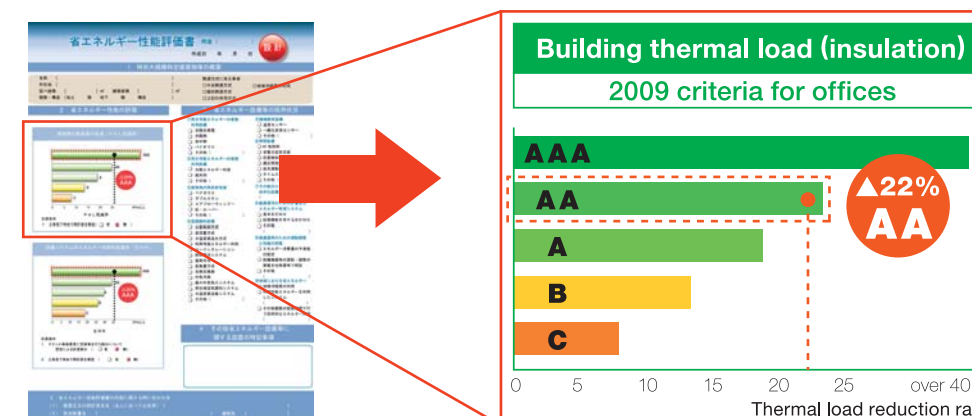


Fig. 6. Energy Performance Certificate

4. Working in All Sectors: Summary of Programs

Tokyo's proactive programs encompass all sectors in the city. Here is the current policy portfolio of TMG :

Industry and commercial sectors

- Tokyo Cap-and-Trade Program
- Tokyo Green Building Program, Energy Performance Certificate Program
- Energy Efficient District Plan Program
- Tokyo CO₂ Emissions Reduction Program for small and medium-sized facilities
- Tax incentives for small and medium-sized facility owners to introduce energy-efficient equipment

Residential sector

- Green Labeling Program for Condominiums
- Tokyo-wide, installation of one million kilowatts of photovoltaic generation equipment in residential dwellings (credit and subsidy scheme)
- Green labeling program for electric appliances (has developed into a nation-wide scheme)

Transportation sector

- Vehicle environmental management program (reporting system)
- Promotion of next-generation vehicles, including electric vehicles
- Promotion of energy-efficient delivery systems using a benchmarking system

Other measures

- Promotion of eco-finance projects
- Promotion of environmental education

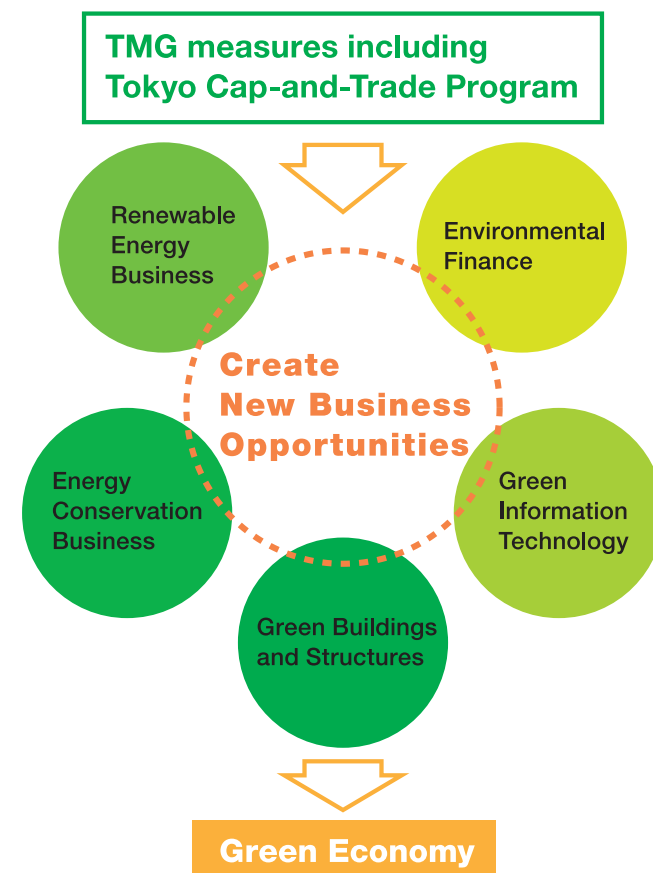


Fig. 7. Emerging Green Economy

5. Toward a Green Economy: Promoting a Low-Carbon Economy

Tokyo has been actively implementing programs to tackle climate change. Along with other environmental policies and programs, they are driving demand and investment toward green businesses that contribute to lower carbon emissions and minimizing environmental impacts. Green technology innovations are also promoted through these efforts.

In particular, significant investments have begun to flow into green buildings and renewable energy projects—directly or indirectly stimulated by low-carbon strategies including the Cap-and-Trade program (Fig. 8). These results are a good example of efforts to transform Tokyo into a low-carbon, sustainable city with a vigorous green economy.

Examples are as follows:

- Retrofit projects to improve energy efficiency in existing buildings are promoted by the Cap-and-Trade Program.
- The world's leading high-performance green buildings are now being built, stimulated by the combination of the Cap-and-Trade Program and the Green Building Program.
- Renewable energy projects are vigorously promoted by encouraging the use of renewable energy in Tokyo through the cap and trade program (Fig. 8).
- On-site solar energy generating devices are being installed in residential units through subsidies and a credit scheme.
- Innovative green technologies and business models are emerging.
- Various businesses are springing up to support energy efficiency and reduction of carbon emissions.

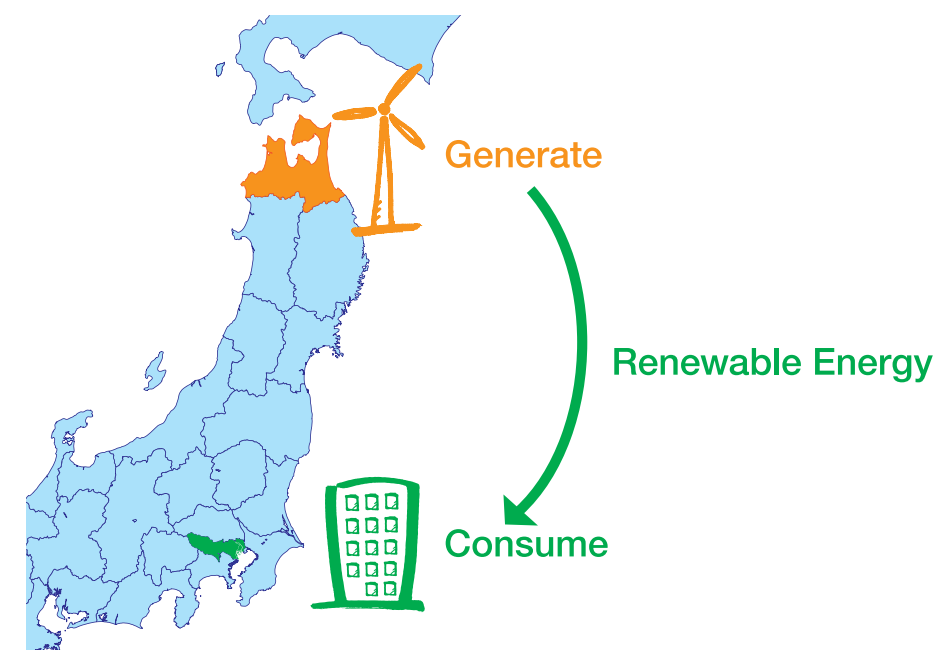


Fig. 8. Promoting renewable energy use in Tokyo stimulates the generation of renewable energy