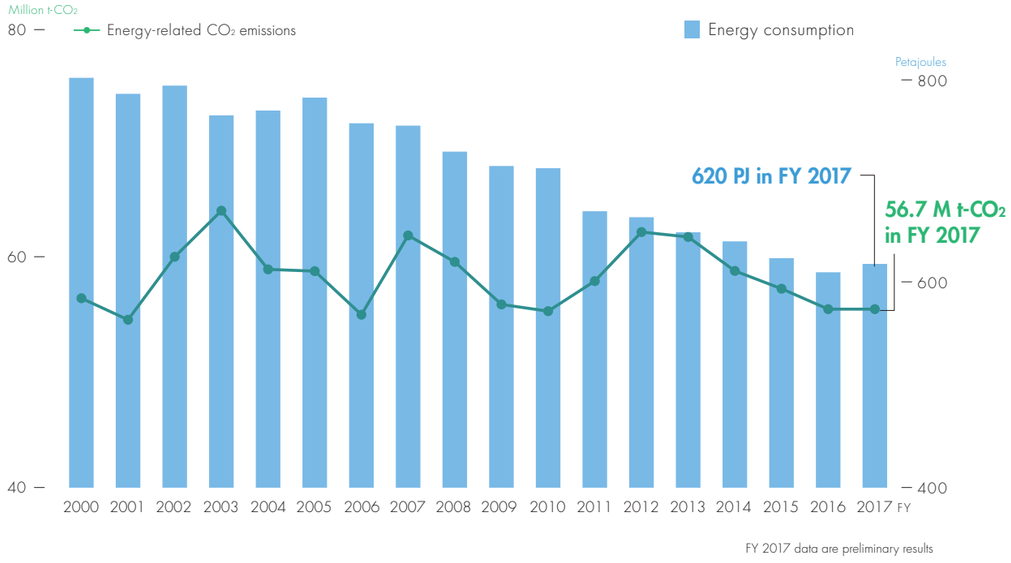
SUSTAINABLE BUILDING POLICY

As a massive energy consumer, TMG has taken pioneering measures for climate change mitigation and energy efficient in the light of the Paris Agreement's long-term goal. Pioneering efforts, such as the Tokyo Cap-and-Trade Program, fine-tuned to the characteristics of a megacity densely packed with a variety of buildings including offices, have produced concrete results and attracted considerable attention of foreign cities, thanks to support from many businesses, citizens, and NPOs in Tokyo.

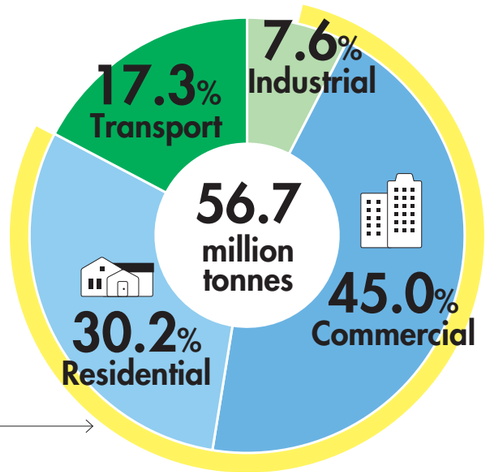
Tokyo's energy consumption has consistently been falling with a peak at around FY 2010, and CO_2 emissions originating from electricity supplied to Tokyo increased following the shutdown of nuclear power plants in the aftermath of earthquakes compared to 2000 levels. Responding to this situation, TMG has set an energy consumption target (see page 3) in addition to the greenhouse gas emission target in order to clarify energy efficiency efforts by citizens and companies in Tokyo.



Trend of energy-related CO_2 emissions and energy consumption in Tokyo

Energy-related CO_2 Emissions in TOKYO

Tokyo's energy-related CO_2 emissions in FY 2017 amounted to 56.7 million tonnes, equivalent to the total emissions of Austria. Commercial and residential sectors constitute a large share of the CO_2 emissions in Tokyo.

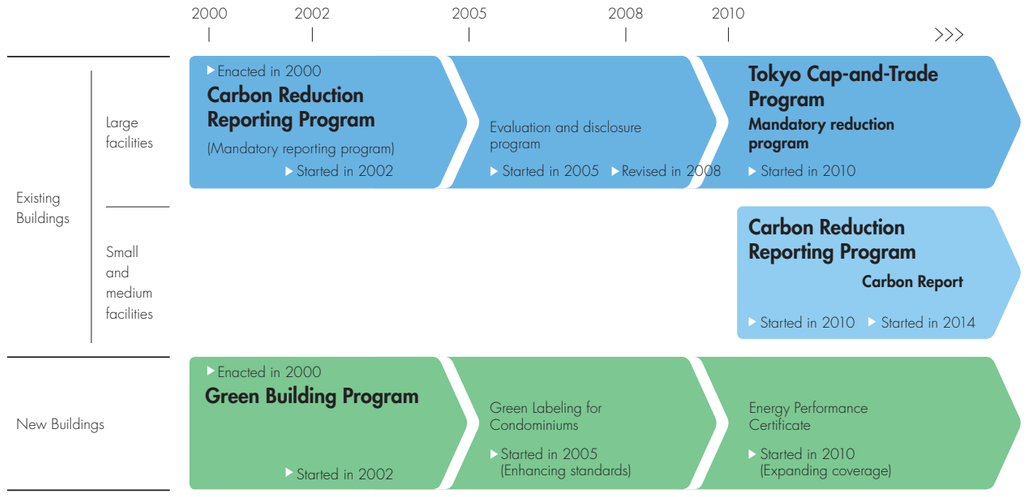


Sectoral breakdown of energy-related CO_2 emissions in Tokyo (FY 2017)

Three Programs Supporting Sustainable Building Policy

TMG has developed effective programs according to building type (new or existing) and size (large or small/medium).

At the core of Tokyo's sustainable building policy, we have the Tokyo Cap-and-Trade Program for existing large facilities, the Carbon Reduction Reporting Program for small and medium facilities, and the Green Building Program for new buildings. Since 2000 when the Tokyo Metropolitan Environmental Security Ordinance was enacted, we have developed effective policies with step-by-step reviews and enhancements.



World's First Urban Cap-and-Trade Program for Large Facilities

In April 2010, TMG introduced the Tokyo Cap-and-Trade Program, which sets mandatory CO_2 emission reduction targets for large facilities. This program 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 as well as the industrial sector, including office buildings, which are often concentrated in megacities.
Owners of facilities covered by the scheme are required to meet their emission reduction requirements through on-site energy efficiency measures or through emissions trading. Measurements, annual reporting, and verification are also required. CO_2 emissions from covered facilities account for approximately 40% of those from the entire industrial and commercial sectors in Tokyo.

Program design

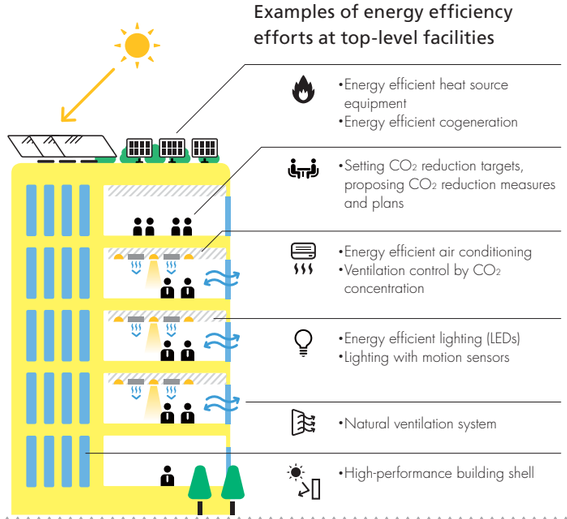
Covered facilities	Approx. 1,200 large CO_2-emitting facilities that consume 1,500 kiloliters or more (crude oil equivalent) of energy annually
Covered gas	Energy-related CO_2
Compliance periods	Five-year period 1st period: FY 2010-FY 2014 2nd period: FY 2015-FY 2019 3rd period: FY 2020 – FY 2024
Compliance factors	1st period: 8% for offices etc. or 6% for factories, etc. 2nd period: 17% or 15% respectively 3rd period: 27% or 25% respectively
Emission trading	Excess reductions and offset credits are tradable
Penalties	Fines, charges (1.3 times the shortfall) Publish the fact of violation

Top-Level Facilities

In the Tokyo Cap-and-Trade Program, facilities demonstrating outstanding performance in emissions reduction as well as in the introduction, use, and management of energy efficient equipment are certified as top-level facilities that receive lower compliance factors according to their rate of progress.
The certification standards for top-level facilities represent the highest-level energy efficiency measures feasible at present, stipulating more than 200 different energy efficiency measures in the case of office buildings.
In the second compliance period, 66 facilities were certified as top-level as of the end of FY 2018.
An increasing number of facilities use the standards as reference guidelines for energy efficiency in design and renovation processes.

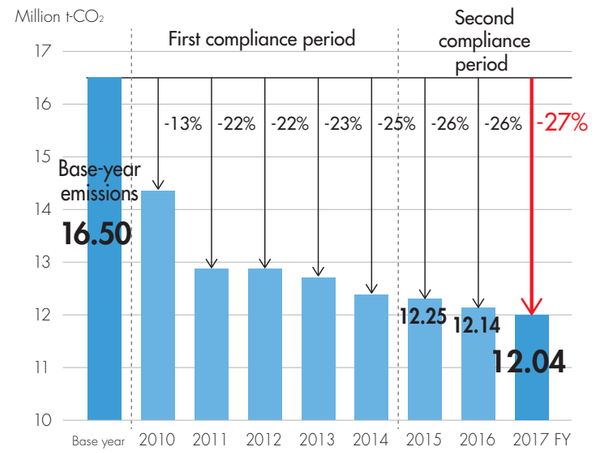
Facilities certified as top-level can use this logo.

Examples of energy efficiency efforts at top-level facilities



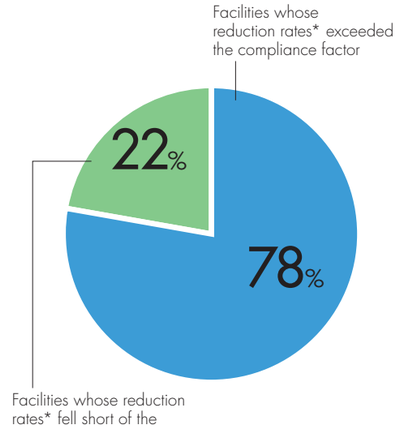
27% Reduction Compared to Base-Year Levels

CO_2 emissions from the covered facilities in FY 2017, the third fiscal year of the second compliance period, were 12.04 million tonnes, a 27% reduction from base-year emissions through energy efficiency measures etc. promoted at the covered facilities. Approximately 80% of the covered facilities have already achieved reductions over and above their compliance factors for the second compliance period.



Trend of total CO_2 emissions from facilities under Tokyo Cap-and-Trade

(Base-year-emissions and annual emissions are calculated using the CO_2 emission factor for electric power applied to the second compliance period)



Ratio of compliance with reduction obligations for the second compliance period through their own energy efficiency measures in terms of results in FY 2017

Encouraging Additional CO_2 Reductions in the Third Compliance Period (FY 2020 to 2024) by Continuing Energy Efficiency and Promoting the Use of Renewable Energy

To realize TMG's goals for 2030 and "Zero Carbon Facilities" desirable in the future, TMG will strive for further reduction at covered facilities in the third compliance period by setting new compliance factors, promoting further energy efficiency action, and enhancing a mechanism to encourage the use of renewable energy.

Items Applicable in the Third Compliance Period

- Compliance factors: 27% for office buildings etc. 25% for factories etc.
- Expanding incentives for promoting the use of low-carbon electricity (electricity from renewable energy sources)
  - All low-carbon electricity that has been procured is calculated as reductions at covered facilities
  - Additional reductions are calculated at covered facilities when procuring electricity with a high percentage of renewable energy sources

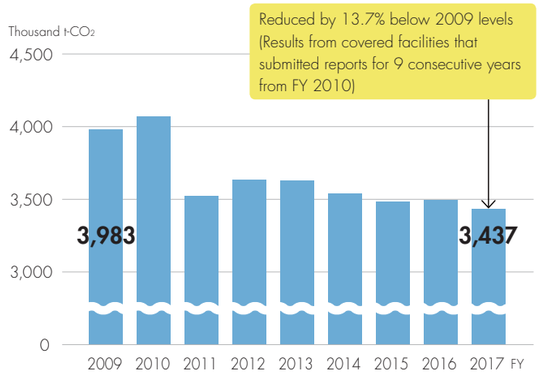
Realization of "Zero Carbon 4 Days in 2020" and cooperation in "Carbon Offset Programme for the Tokyo 2020 Games"

As a stepping stone to a Zero Emission Tokyo, TMG has started the "Tokyo Zero Carbon 4 Days in 2020" project – offsetting all CO_2 emissions that will be generated across Tokyo during the 4 days of opening and closing ceremonies of the Tokyo 2020 Games with carbon credits from the Tokyo Cap-and-Trade Program. In addition, as the host city for the Games, TMG has been working with the Tokyo 2020 Organising Committee to offset CO_2 emitted by activities connected with the Tokyo 2020 Games. To this end, TMG has been calling for the cooperation in the provision of credits from the facilities under the Tokyo Cap-and-Trade Program.

SUSTAINABLE BUILDING POLICY_2

Carbon Reduction Reporting Program for Small and Medium Facilities

CO_2 emissions from small and medium facilities account for approximately 60% of the total of the combined industrial and commercial sectors in Tokyo, underlining the importance of reducing emissions from these facilities.
TMG introduced the Carbon Reduction Reporting Program in FY 2010 to encourage owners of small and medium facilities to identify their CO_2 emissions and implement energy efficiency measures. Starting in FY 2020, TMG will introduce a mechanism that evaluates and publicizes businesses with excellent reduction performance or that have made great efforts to introduce renewable energy in order to motivate businesses to take action.
Using data given in the reports, TMG provides Low Carbon Benchmarks to recognize their performance; self-rating of emission levels compared to the same business type and a Carbon Report that depicts energy efficiency levels in an easy-to-understand format.

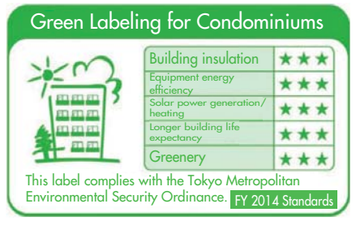


Trend of emissions from covered facilities (excluding facilities that submit reports voluntarily)

SUSTAINABLE BUILDING POLICY_3

Green Building Program for New Buildings

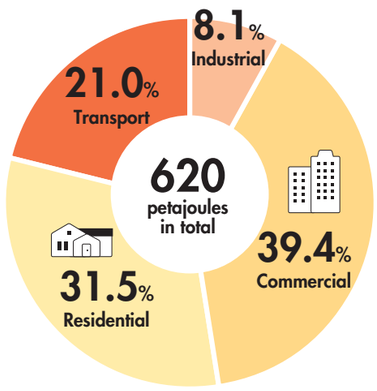
By requiring owners who build large buildings to submit a Building Environmental Plan and disclosing an outline of the plan, this program encourages their voluntary environmental conservation efforts at the architectural planning stage and aims to form a market that attributes value to environmentally conscious buildings. Subject to TMG's evaluation criteria, building owners make three-grade evaluations in four areas of environmental considerations: rational use of energy, proper use of resources, natural environment conservation and mitigation of heat island effects.
From FY 2020, TMG will expand the program coverage and introduce ZEB (Net Zero Energy Building) Evaluation as a higher rank than the highest one in the current program for the purpose of energy efficiency assessment of equipment systems.



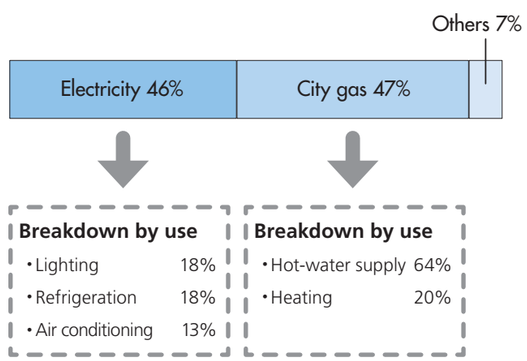
Condominium owners are required to display the environmental performance label on all advertisements upon sale or lease.

PROMOTING ENERGY EFFICIENCY MEASURES AT HOME

The energy consumption of the residential sector in Tokyo accounts for approximately 30% of total consumption, of which over 90% is caused by the use of electricity and city gas.
Through the LED light bulb exchange campaign from 2017 to 2018, TMG promoted the switch to LED from lighting with high energy consumption.
In order to encourage additional energy efficiency action at home, TMG continues promoting LED lights and expanding the introduction of energy-efficient home appliances and housing with high energy-efficient performance.



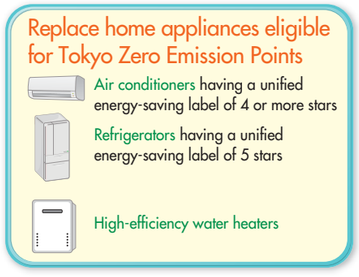
Sectoral breakdown of energy consumption in Tokyo (FY 2017)



Breakdown of energy consumption by use at home (FY 2017)

Promoting Zero Emission Action at Home

In October 2019, TMG will start new action to grant Tokyo Zero Emission Points that can be exchanged for gift certificates or LED light bulbs coupons. The points will be given to Tokyo residents who have replaced their air conditioners, refrigerators or water heaters, which typically consume larger amounts of energy, with those having a high energy-efficient performance.
TMG will also provide energy efficiency advice to those who have made the replacement to improve their energy efficiency awareness.

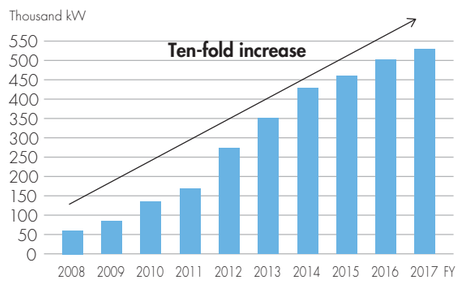


Promoting the Tokyo Zero Emission House

To reduce energy consumption at home, it is critical to make residential buildings more energy efficient, including improvements in thermal insulation.
Aiming for the spread of houses with high energy-efficient performance matching the regional characteristics of Tokyo, from October 2019 TMG will subsidize new residential buildings that meet the Tokyo Zero Emission House specifications.

EXPANSION OF USE OF RENEWABLE ENERGY

FY 2017, power generated by renewable energy accounted for approximately 14.1% of the total electricity used in Tokyo. The introduction of solar power generation has been amplified through support projects of TMG with information available online through the Tokyo Rooftop Solar Register, and the Feed-in-Tariff (FIT) system started by the national government in 2012.



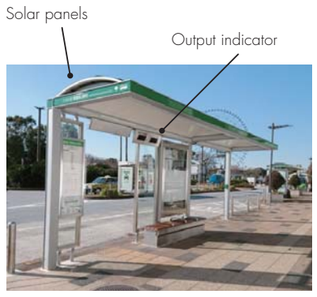
Trend of solar power generator installation in Tokyo

Further Expansion of Use in Harmony with Tokyo's Characteristics

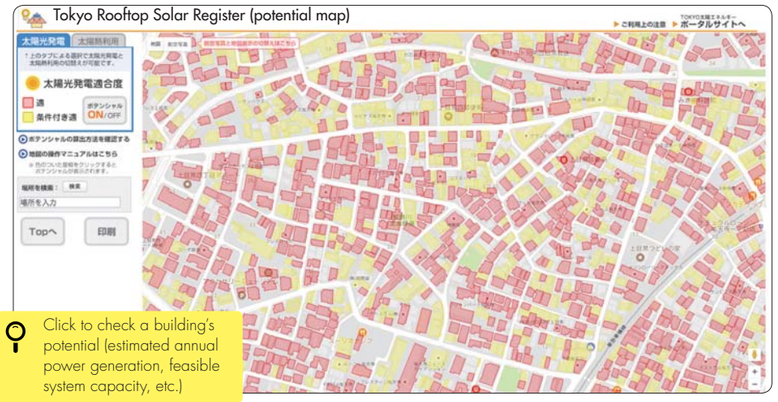
High land prices in Tokyo make it difficult to install large generators. However, densely built-up Tokyo has significant potential for setting up solar power generators. TMG supports local-production-for-local-consumption renewable energy.

Promoting the adoption of solar energy

Online information is provided by the Tokyo Rooftop Solar Register, which clearly shows buildings' suitability for solar power generators and other equipment.



Solar power generation at a bus stop

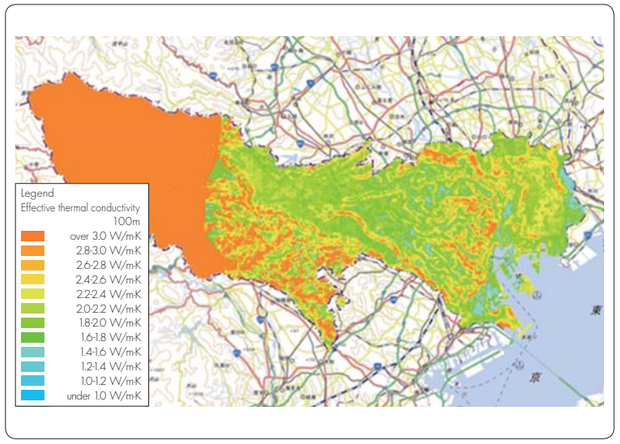


Click to check a building's potential (estimated annual power generation, feasible system capacity, etc.)

TMG's official mascot character: Roof Power

Promoting the use of other renewable energy

TMG provides online information on the potential for the adoption of geothermal heat and subsidizes the early stages of adoption.
We also encourage energy use matching business characteristics, including the use of sewage heat, as well as small hydroelectric generation at water supply and sewage facilities.



Ground source heat potential map: potentiality is color-coded with warmer colors indicating higher heat exchange efficiency.

Efforts Made for Both Supply and Demand

As a massive electricity consumer, Tokyo depends on power sources in many other regions for much of its power supply. TMG will encourage the expanded adoption of renewable energy in Japan as well as in Tokyo through efforts in both supply and demand.

Measures for energy suppliers

To improve the environmental properties of electricity, TMG requires electricity suppliers for Tokyo to reduce CO_2 emission factors, set targets for renewable energy volume, and report the results through the Environmental Energy Reporting Program.

Mechanisms for consumers to select electricity from renewable energy

In light of the full liberalization of the retail selling of electricity, TMG depicts renewable energy sources for power through the Green Labeling for Condominiums program and stimulates consumers to select renewable energy by providing information about the advantages.

100% Renewable Energy at Tokyo Metropolitan Government City Hall

In agreement with the RE100* philosophy, TMG has been promoting "100% renewable electricity purchase policy at the Tokyo Metropolitan Government city hall" since 2019. TMG started purchasing electricity sourcing all renewable energy at the Building No. 1 in August 2019.

Promoting the Use of Renewable Energy at Businesses and Others

In June 2019, TMG, together with businesses pledging RE100 and renewable energy electricity distributors, held the Action Meeting with the aim of creating a major movement to expand the use and supply of electricity from 100% renewable energy. Taking this as an opportunity, TMG is extensively calling for the use of electricity from renewable energy, providing an occasion for matching businesses with electricity distributors.

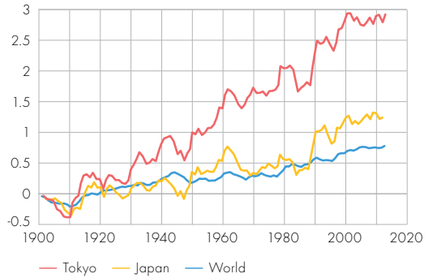
100% RE Action Meeting
(held in June 2019)

* RE100: An international collaboration initiative sponsored by the Climate Group and CDP that is committed to sourcing electricity used by businesses for their operations from 100% renewable energy.

MITIGATION OF URBAN HEAT ISLAND

Urban heat island effects have continued in Tokyo as urbanization progresses. Ahead of the Tokyo 2020 Olympic and Paralympic Games, measures to reduce heat for citizens and tourists have become a critical challenge.

The daily mean maximum temperature in August, the month in which the Tokyo 2020 Games will take place, was 32.4℃ from 2010 to 2014.



Changes in annual average temperature anomalies in the world, Japan, and Tokyo since 1900

Creation of Cool Spots

In collaboration with business operators and municipalities ready to install fine mist generation equipment or plant more flowers and trees, TMG has been creating cool spots for heat mitigation to allow citizens and tourists to stroll comfortably during midsummer.
Towards the Tokyo 2020 Games, TMG has introduced heat mitigation equipment around the arenas, covering many spots to create a cool area.

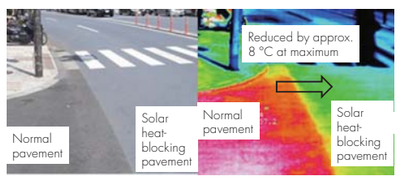
Fine mist and green walls

"Uchimizu" (Water Sprinkling)

Sprinkling water is part of the traditional Japanese culture. Sprinkling water in front of houses or stores lowers the temperature of the hot ground surface, helping mitigate the summer heat. TMG is making efforts to promote Uchimizu activities in conjunction with citizens and businesses in Tokyo.

Laying Solar Heat-Blocking Pavements, Maintenance and Management of Trees

For Tokyo metropolitan roads mainly in the central core area, TMG has laid solar heat-blocking pavements and water retaining pavements to mitigate road surface temperature rise. With the goal of paving approximately 136 km in total by the Tokyo 2020 Games, TMG completed approximately 126 km at the end of FY 2018.
To ensure the shade of trees blocking the blaze of the sun in summer, TMG properly maintains trees along Tokyo metropolitan roads as well as those in parks, including keeping a mass of greenery through planned pruning.



Road surface cooled with solar heat-blocking pavement

Heat Countermeasures for Spectators at the "Last-Mile*" to the Venues of the Tokyo 2020 Games

To ensure the success of the Tokyo 2020 Games, TMG conducted trial verifications at test events in the summer of 2019 concerning heat countermeasures for spectators at the "last-mile" to the venues, and the roadside areas of on-the-road sports events.
At test events of five competitions, TMG distributed cooling goods and installed temporary tents, misting devices, etc. on a trial basis. Based on the verification results, TMG puts together a plan for measures to be taken in the Tokyo 2020 Games.

* "Last Mile" route: a route for spectators between transportation hubs (e.g. train stations) and competition venues.

EXPANDING THE USE OF ZERO EMISSION VEHICLES (ZEVs)

To realize a Zero Emission Tokyo, TMG has set a goal to increase the market share of ZEV—vehicles not emitting any CO_2 or air pollutants during driving, such as EVs, PHVs and FCVs—to 50% of new passenger car sales by 2030. TMG accelerates the introduction of vehicles and infrastructure development to achieve this goal.

Promoting the Use of ZEVs

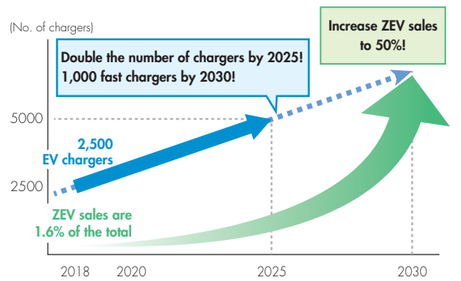
As the price difference from gasoline-powered vehicles presents an obstacle when residents and businesses in Tokyo consider the purchase of ZEVs, TMG builds on the financial support it provides along with the national government to clear obstacles to the purchase of ZEVs.
Since March 2017, fuel-cell buses have been introduced on regular routes on Tokyo metropolitan bus lines. They are the first commercially-available fuel-cell buses operated as route buses in Japan.

Electric vehicle

Fuel cell bus

Promoting the Installation of EV Chargers and Hydrogen Stations

In order to eliminate users' anxiety about insufficient charging opportunities and promote the installation of EV chargers as social infrastructure, TMG promotes installation at public facilities and subsidizes installation costs at private facilities, such as multi-family residential buildings and commercial facilities. Through these efforts, TMG aims to double the number of EV chargers installed in Tokyo by 2025 and increase the number of fast chargers to 1,000 by 2030. By means of massive financing and effective use of its site, TMG will encourage the spread of hydrogen stations. They will be primarily installed in areas with a concentration of Tokyo 2020 Games arenas and along transportation routes for athletes and officials.



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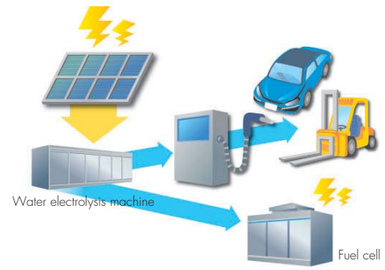
Hydrogen station

CREATING A HYDROGEN-BASED SOCIETY

Hydrogen is a clean energy that emits only water when used, helping reduce environmental load as well as contributing to a diversified energy mix, with a spillover effect on economy and industries, and response to emergencies. When the use of hydrogen derived from renewable energy, rather than depending on fossil fuels, is made practical in the future, hydrogen-based energy will be a definitive step towards a low-carbon society.
To realize a hydrogen-based society, a JPY 40 billion fund has been set up to support efforts to be made through to the Tokyo 2020 Olympic and Paralympic Games.

Promoting the Use of CO_2 Free Hydrogen

To take full advantage of hydrogen energy in realizing a decarbonized society, we need to aggressively introduce hydrogen derived from renewable energy sources. For the production and future use of CO_2-free hydrogen, TMG will encourage facilities in Tokyo to install equipment for using hydrogen derived from renewable energy and consider hydrogen supply systems that use renewable-energy-sourced power from Tohoku and other regions.



Use of CO_2-free hydrogen (image)

Effective Use of Hydrogen Stimulated by the Tokyo 2020 Games

TMG will install hydrogen stations in the Olympic Village after the Tokyo 2020 Games to supply hydrogen to FCVs and Bus Rapid Transit (BRT). To realize the first full-scale hydrogen supply system in Japan and make it a model for achieving a hydrogen society, TMG will introduce new technologies, including hydrogen pipelines and next-generation hydrogen fuel cells.


©Designated Builder of Urban Redevelopment Project in the west Harumi 5-Choume District
Olympic Village after the Tokyo 2020 Games (image)

Education Center

At the end of July 2016, TMG opened an education center to promote the spread of information about hydrogen energy, and allow citizens and facilities in Tokyo to learn more about the significance, technologies, safety, and future of a hydrogen-based society. It also helps small and medium operators of hydrogen stations learn the skills necessary to operate their stations successfully and safely, as well as promoting facility tours at home and abroad.


Tokyo Hydrogen Museum