

Tokyo Environmental Master Plan

September 2022

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TOKYO
METROPOLITAN
GOVERNMENT

A Green and Resilient Global City Tokyo Opens up a Future - Create a Brighter Future for All -

The environmental situation is posing serious issues on a global scale, such as an even further aggravated climate crisis, biodiversity loss, and changes in the water environment and air quality, requiring us to act on it immediately. Natural disasters seem to be breaking records almost every year, and the impacts of climate change have extended to the daily lives of people. In addition, the unstable supply of crude oil and natural gas due to the energy crisis after February 2022 poses a threat to Japan, which depends on imports for most of its fossil fuels.

Facing two crises, the climate crisis and the energy crisis, the world is moving forward with structural transformations aimed at decarbonization and improved energy self-sufficiency. The Tokyo Metropolitan Government (TMG) also needs to refine its policies from the perspective of the HTT (Herasu (save), Tsukuru (generate), and Tameru (store) electricity) initiatives and realize decarbonization and energy security in an integrated manner. It is our mission for future generations to make the efficient use of energy and utilization of renewable energy common practice.

To help Tokyo move ahead with a sustainable recovery from the COVID-19 crisis and develop as a city that will still be attractive and prosperous 50 to 100 years from now, we must pursue efforts that lead the national government and rest of the world and take the lead in resolving environmental issues that are becoming increasingly diversified and aggravated.

Since the era of high economic growth, the TMG has been working on environmental issues, such as air and water pollution and waste. The air quality in Tokyo has dramatically improved thanks to programs such as diesel vehicle control implemented ahead of the national government's standards. The world's first urban cap-and-trade program, which was introduced in 2010 as a climate change measure, has achieved great results with the cooperation of businesses. In addition, we are accelerating efforts toward "Carbon Half," a plan to halve greenhouse gas (GHG) emissions by 2030, with an eye to the realization of a Zero Emission Tokyo that will contribute to achieving net zero CO₂ emissions worldwide by 2050.

The Tokyo Environmental Master Plan, which was revised recently, sets out specific targets and the shape of initiatives based on the recognition that actions in the period up to 2030 are extremely important to realize the visions for 2050.

We will comprehensively solve environmental issues in various fields through the 3+1 Strategies consisting of Strategy 0 to deal with the impending energy crisis promptly and accurately in addition to the three strategies: Energy Decarbonization and the Sustainable Use of Resources, Realization of an Environmentally Symbiotic, Prosperous Society, and Realization of a Better Urban Environment.

"TIME TO ACT"—Now is the time to accelerate actions. Based on the plan, we will work together with Tokyo residents, businesses, and other various entities to realize a green and resilient global city Tokyo opening up a future that is sustainable, safe, secure, and comfortable, balancing growth with maturity.

September 2022



KOIKE Yuriko
Governor of Tokyo



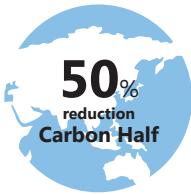
Vision for a Desirable City and 2030 Targets in the Environmental Master Plan

Tokyo's Vision for a Desirable City

The aim is to realize **a green and resilient global city Tokyo opening up a future** that is sustainable, safe, secure, and comfortable, balancing growth with maturity

Main 2030 Targets

GHG emissions



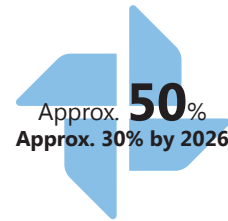
GHG emissions compared to 2000

Energy



Energy consumption compared to 2000

Renewable energy



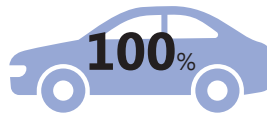
Percentage of power generated by renewable energy

Solar power generation



Installation of solar power generation equipment in Tokyo

Automobiles



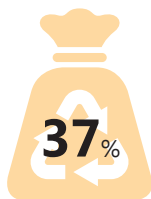
Phasing out the sale of new gasoline-only passenger cars in Tokyo

Hydrogen



Number of hydrogen stations

Recycling



Municipal solid waste recycling rate

Plastics



Incineration of plastics from households and large office buildings compared to FY 2017

Food waste



Food waste compared to FY 2000 levels

Hydrofluorocarbons



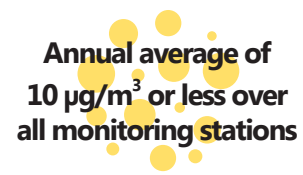
Hydrofluorocarbons (HFCs) emissions compared to FY 2014

Biodiversity



State of biodiversity

Air quality

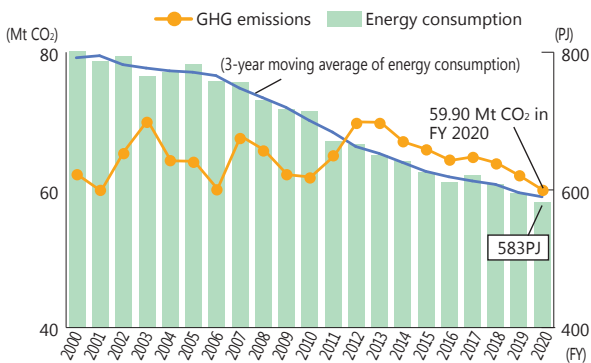


PM2.5 concentrations

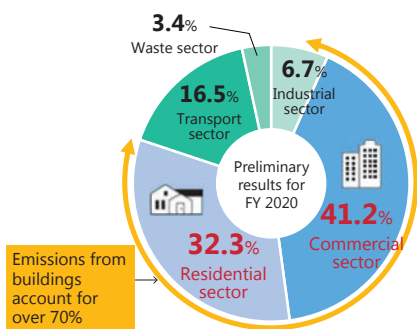
Status Quo of the Environment in Tokyo

GHG Emissions and Energy Consumption

Changes in GHG emissions and energy consumption



Sector breakdown of CO₂ emissions in Tokyo



- Greenhouse gas emissions in Tokyo have been on an almost downward trend since FY 2012 because of reduced energy consumption and improvements in the CO₂ emission factors of electricity and were 59.90 Mt CO₂ in FY 2020
- Energy consumption in Tokyo in FY 2020 was 583 PJ, resulting in a decrease of approximately 27.3% from FY 2000. It peaked around FY 2000 and has been on a downward trend since then
- 70% of Tokyo's CO₂ emissions come from energy use in buildings, posing an urgent need to strengthen measures in the commercial and residential sectors
- Since the consumption, production, and disposal of energy and resources heavily depend on other regions, CO₂ emissions need to be reduced at home and abroad on a consumption basis

Natural Environment

- Tokyo spreads out from the mainland to the Ogasawara Islands, or approximately 1,700 km from north to south, and has a variation in elevation of more than 2,000 m and climate zones ranging from subarctic through subtropical and tropical
- Tokyo consists not only of urban central areas with parks and other green spaces, but also of different natural environments: satoyama (community-based forest areas) and wooded areas full of biodiversity, and islands with a unique natural environment and ecosystem
- On the other hand, urban development has led to the fragmentation and shrinkage of green spaces and a decrease in habitats for a variety of living things
- There are concerns about the lower quality of greenery due to reduced care afforded by humans, the accompanying decrease in the multifaceted functions of nature, and the adverse impact on ecosystems caused by the introduction of alien species

Yoyogi Park



Lake Okutama



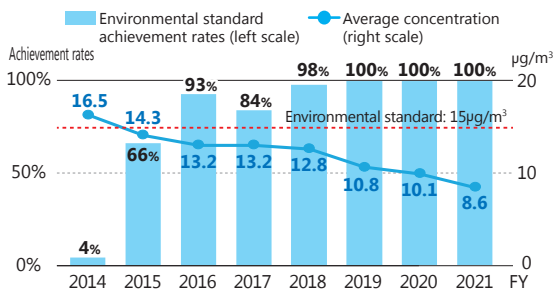
Ogasawara Minami-Jima (South Island)



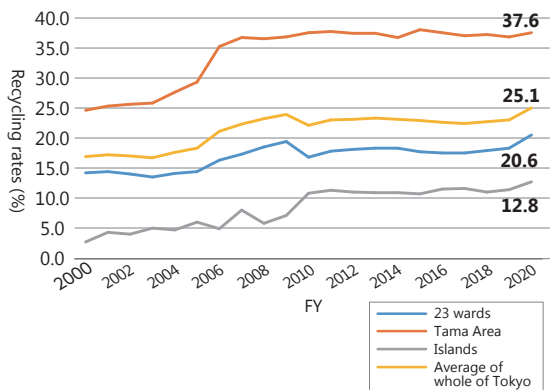
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Urban Environment

Changes in achievement rates of the PM2.5 environmental standard in Tokyo and average concentration of all monitoring stations



Changes in municipal solid waste recycling rates in Tokyo



- The air quality has significantly improved due to regulations controlling the use of diesel vehicles and the reduction of emissions from factories. The PM2.5 environmental standard has been achieved at all monitoring stations since FY 2019
- Photochemical oxidants have exceeded their environmental standards
- Municipal solid waste recycling rates have been flat since FY 2010 and were approximately 25% in FY 2020
- The recycling rate in the Tama Area, where the amount of disposal is controlled by charging for household waste, has reached approximately 38% while it has remained at approximately 21% in the 23 wards

* Numerical values and other data were updated at the end of September 2022

Revision of the Tokyo Environmental Master Plan

- Climate crisis and biodiversity loss have become further aggravated, while we have had to face other crises, such as infectious diseases and international conflicts
- With the understanding of Tokyo residents, businesses, and organizations, the Tokyo Environmental Master Plan was revised in September 2022 to create a prosperous and sustainable city through a sustainable recovery
- We are boldly accelerating efforts toward “Carbon Half,” a plan to halve greenhouse gas (GHG) emissions in Tokyo by 2030 from those in 2000, aiming to realize a Zero Emission Tokyo that will contribute to achieving net zero CO₂ emissions worldwide by 2050

Zero Emission Tokyo Strategy in December 2019

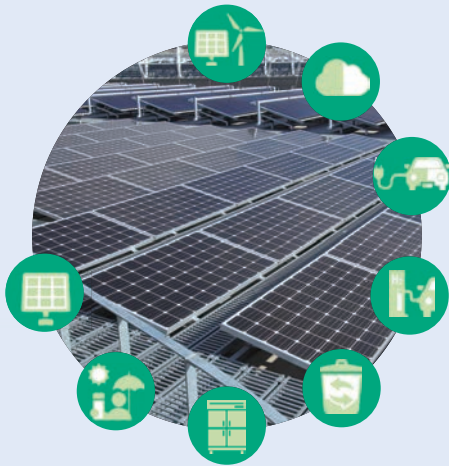


Zero Emission Tokyo Strategy 2020 Update & Report in March 2021



Key Strategies and Direction of Efforts in the Environmental Master Plan

Strategy 0: Integrated Realization of Decarbonization and Energy Security Spurred on by the Crisis



Strategy 1: Realization of Zero Emissions through Energy Decarbonization and the Sustainable Use of Resources

- Strategy 1-1: Making Renewable Energy a Major Energy Source
- Strategy 1-2: Expanding Zero Emission Buildings
- Strategy 1-3: Promoting Zero Emission Mobility
- Strategy 1-4: Expanding the Use of Hydrogen Energy
- Strategy 1-5: Realizing the Sustainable Use of Resources
- Strategy 1-6: Efforts toward Zero Hydrofluorocarbon Emissions
- Strategy 1-7: Promoting Climate Change Adaptation Measures
- Strategy 1-8: Bold Acceleration of TMG's Initiatives for Its Own Sustainability

Strategy 2: Realization of an Environmentally Symbiotic, Prosperous Society that Continues to Benefit from Biodiversity



Strategy 3: Realization of a Better Urban Environment that Ensures the Safety and Health of Tokyo Residents

- Strategy 3-1: Further Improving Air Quality Etc.
- Strategy 3-2: Reducing Risks Caused by Chemical Substances Etc.
- Strategy 3-3: Further Promoting the Proper Treatment of Waste

Cross-Sectional and Comprehensive Initiatives to Enhance the Effectiveness of Policies



CLIMATE ACTION

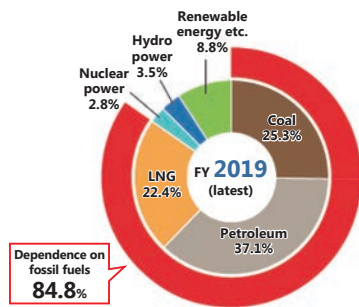
Environmental issues are interconnected; Comprehensive and integrated efforts are important
Comprehensively solve pressing issues through the 3+1 Strategies

Strategy 0: Integrated Realization of Decarbonization and Energy Security Spurred on by the Crisis

Status Quo

- The risk of dependence on fossil fuels has been revealed again by the energy crisis
- In light of the future international situation, there is concern that the impact of the energy crisis will be prolonged

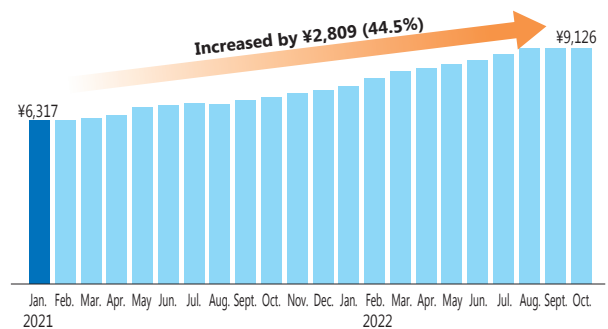
Primary energy supply mix of Japan



Source: Agency for Natural Resources and Energy, Japan's Energy 2021 Edition.

- Electricity prices for standard households are at the highest level in the past five years
- Electricity supply and demand in summer and winter in FY 2022 will be tight nationwide

Electricity prices of Tokyo Electric Power Company (TEPCO)



Source: Data published by TEPCO

TMG's Efforts to Date

- Develop a campaign using HTT (⊕ Herasu (save), ⊕ Tsukuru (generate), and ⊕ Tameru (store) electricity) as a keyword
- Strengthen cooperation with economic organizations, the eight prefectures surrounding Tokyo, municipalities, schools, and neighborhood associations
- Enhance support measures, such as expansion of subsidies, relaxation of requirements for them, and raising of their upper limits
- Make emergency requests to the national government and TEPCO for a stable energy supply and acceleration of decarbonization
- Thoroughly implement its own initiatives in energy efficiency, power saving, and the introduction of renewable energy

Promotion of the campaign at a home appliance store



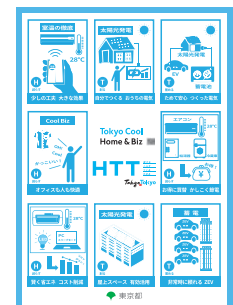
HTT awareness logo



HTT special class at an elementary school



HTT awareness poster



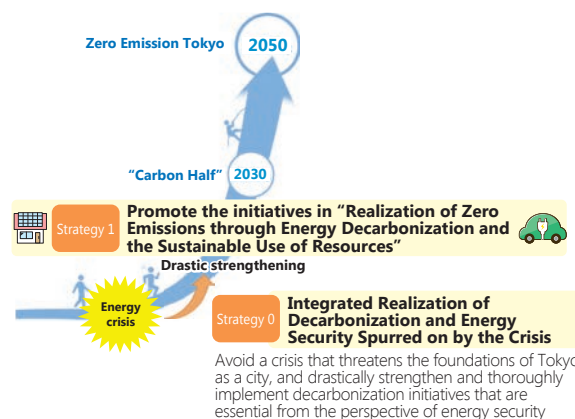
Direction of Policies

● Dealing with the impending energy crisis

- Promote efforts for a stable supply of electricity in collaboration with various entities, such as reaching out to Tokyo residents and businesses, and strengthening cooperation with the Nine Local Governments Coalition
- Aggressively develop strategically "convincing" publicity to ensure the effectiveness of efforts
- Back up efforts through support measures that encourage Tokyo residents and businesses to reduce power consumption when power supply and demand are tight
- Further dig into power saving and energy efficiency measures and maximize the introduction of solar power generation equipment as TMG's initiatives for its own sustainability

● Drastic strengthening of energy decarbonization initiatives

- Realize decarbonization and energy security in an integrated manner by significantly enhancing the initiatives in Strategy 1



Strategy 1: Realization of Zero Emissions through Energy Decarbonization and the Sustainable Use of Resources

Visions for 2050

- A Zero Emission Tokyo realized, contributing to achieving net zero CO₂ emissions worldwide

2030 Targets



GHG emissions in Tokyo compared to 2000:
50% reduction ("Carbon Half")



Energy consumption in Tokyo compared to 2000:
50% reduction

Sectoral targets for energy-related CO₂ emissions

	FY 2020 (preliminary results)	2030
Industrial/commercial sector	-7.4%	Approx. 50% reduction
Residential sector	+32.9%	Approx. 45% reduction
Transport sector	-50.7%	Approx. 65% reduction

Sectoral targets for energy consumption

	FY 2020 (preliminary results)	2030
Industrial/commercial sector	-26.7%	Approx. 35% reduction
Residential sector	+9.9%	Approx. 30% reduction
Transport sector	-54.9%	Approx. 65% reduction

* Numerical values and other data were updated at the end of September 2022

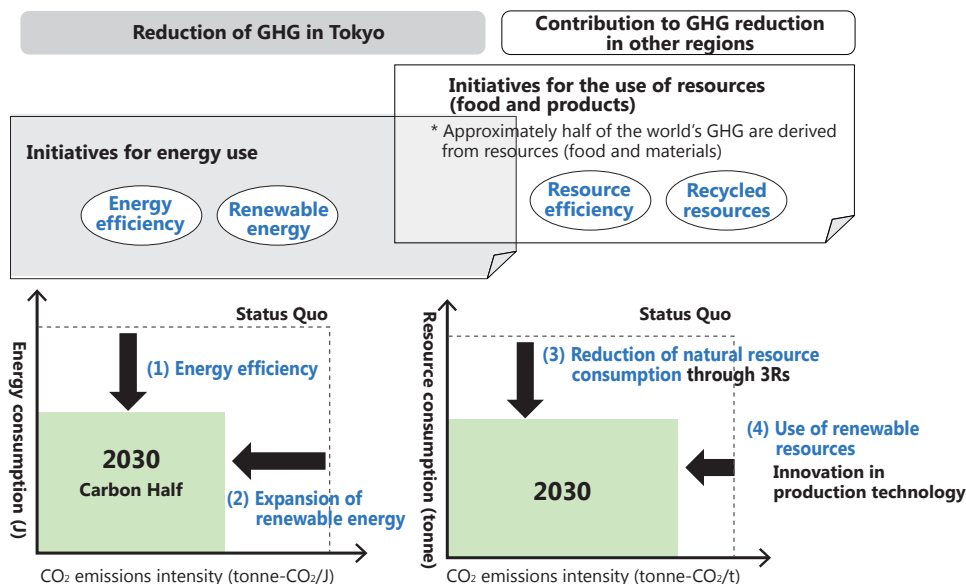


Percentage of power generated by renewable energy: **Approx. 50%**
(Intermediate target: Approx. 30% by 2026)

Basic Concept for Actions toward 2030

- Promote both mitigation and adaptation measures to minimize risks from climate change impacts
- Develop sustainable resource management initiatives that consider all stages of the supply chain
- Promote efforts from the perspective that climate change is interconnected with other fields, such as biodiversity and air quality

➡ For the deployment of initiatives in each sector, decisively develop the efforts (1) to (4) shown in the figure below



Strategy 1-1: Making Renewable Energy a Major Energy Source



Visions for 2050

- All energy used to be decarbonized
- Supply of fully decarbonized electricity using renewable energy as a major power source
- Standardization of local production and consumption of renewable energy and energy sharing

2030 Targets

Percentage of power generated by renewable energy

Approx. 50%
(approx. 30% by 2026)

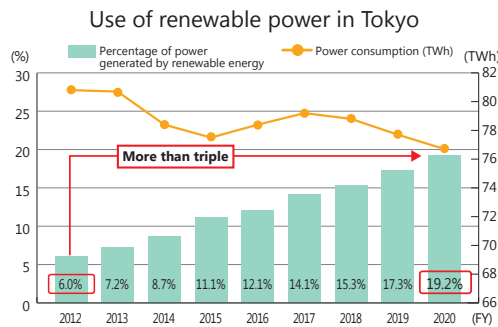


Installation of solar power generation equipment in Tokyo

2.0 GW or more

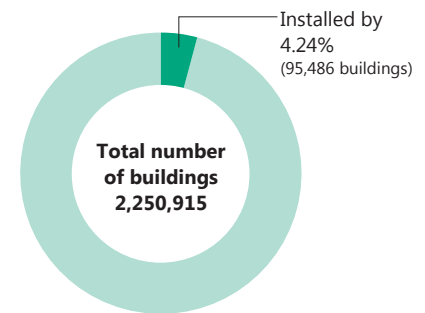
Status Quo

- The percentage of power generated by renewable energy in Tokyo in FY 2020 was 19.2%, more than tripling in the last eight years
- In addition to maximizing the introduction of renewable energy equipment in Tokyo, it is necessary to further increase the percentage of renewable energy used for the electricity provided by electricity suppliers
- In FY 2020, the capacity of solar power generation equipment installed in Tokyo was 646 MW
- Installed capacity is increasing year by year, but there is still great untapped potential in Tokyo



Source: Survey on the use of renewable energy in Tokyo

Percentage of installation of solar power generation equipment in Tokyo



Source: Survey by the Bureau of Environment, Tokyo Metropolitan Government

Direction of Policies

- Standardization of the introduction and use of solar power generation equipment etc.
 - Develop initiatives focusing on the use of solar power generation equipment that has a high potential for installation at buildings as Tokyo has been increasingly urbanized and has many buildings
 - Decisively and swiftly promote the standardization of the new installation and use of solar power generation equipment, including the revision of programs through ordinances
 - Establish a council consisting of related businesses to build a reuse and recycling system for houses in anticipation of the disposal of a large number of solar panels
- Expansion of the introduction and use of renewable energy at businesses
 - Promote the expanded introduction and use of renewable energy at buildings by strengthening and expanding programs, such as the Tokyo Cap-and-Trade Program and Tokyo Green Building Program, by means of ordinances
 - Expand the use of self-consumption renewable energy equipment that contributes to mitigating power grid load and improving regional disaster preparedness
 - Promote efforts to procure renewable power sources off-site, or from locations far away from the point of demand
- Expansion of the introduction and use of renewable energy at home
 - Establish a program based on an ordinance that requires certain new, small and medium-sized houses to install solar power generation equipment and a ZEV charger
 - Decisively promote the installation of solar power generation equipment and storage batteries at new and existing houses
 - Promote a campaign for group buying of renewable power to encourage the use of renewable power by Tokyo residents with a view to its nationwide expansion
- Realization of zero emission islands
 - Expand the introduction of renewable energy that contributes to securing electricity in the event of a disaster in the islands with diverse potential for renewable energy
- Measures for energy suppliers
 - Strengthen and expand the Energy Environment Program to expand the supply of renewable power by electricity suppliers and increase the percentage of renewable energy in grid power

“Renewable Power Together” campaign logo



Strategy 1-2: Expanding Zero Emission Buildings



Visions for 2050

- All buildings in Tokyo to be zero emission buildings*
 - All buildings to be zero emission buildings that account for adaptation measures (resilience), such as disaster prevention and heat countermeasures

* Buildings decarbonized by ensuring energy efficiency and using renewable energy

2030 Targets

Greenhouse gas emissions compared to 2000

50% reduction

Energy consumption compared to 2000

50% reduction

Percentage of power generated by renewable energy

Approx. 50%
(approx. 30% by 2026)

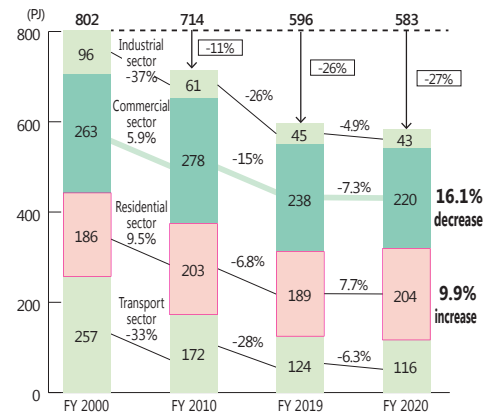
Installation of solar power generation equipment in Tokyo

2.0 GW or more

Status Quo

- Final energy consumption in the commercial sector in FY 2020 decreased by 16.1% from FY 2000
- Final energy consumption in the residential sector in FY 2020 increased by 7.7% from the previous fiscal year, partly because of longer time spent at home due to the COVID-19 crisis. It was the only sector that showed an increase from FY 2000
- New houses are expected to account for the majority by 2050, and their environmental performance will have a major impact on the realization of a decarbonized society

Sectoral changes in energy consumption



Direction of Policies

Expand zero-emission buildings and houses by for example standardizing zero-emission specifications to make a shift to resilient and healthy houses

- Strengthening and expanding programs through ordinances (RE = Renewable energy, EE = Energy efficiency)

	New construction buildings	Existing buildings
Large 2,000 m ² and more	Tokyo Green Building Program for New Buildings including condominiums (Strengthened) <ul style="list-style-type: none"> RE • Mandatory consideration of the introduction/use of renewable energy EE • Mandatory conformance to standards for thermal insulation and energy efficiency performance except for houses • Mandatory installation of renewable energy equipment, such as solar power generation equipment, and a ZEV charger • Strengthen energy efficiency performance specifications beyond national standards 	Tokyo Cap-and-Trade Program (Strengthened) <ul style="list-style-type: none"> RE • Emission reductions through low-carbon electricity EE • CO₂ emission reduction obligations • Enhance mechanisms to promote the expanded use of renewable energy • Incentive measures to encourage active efforts etc.
	Program That Requires Certain Small and Medium-Sized New Buildings to Install Solar Power Generation Equipment (New) <ul style="list-style-type: none"> RE • Mandatory installation of solar power generation equipment and a ZEV charger EE • Mandatory installation of thermal insulation and energy efficiency performance equipment etc. 	Carbon Reduction Reporting Program for Small and Medium-Sized Facilities (Strengthened) <ul style="list-style-type: none"> RE • Mandatory reporting on the use of renewable energy EE • Mandatory reporting on CO₂ emissions and energy efficiency measures • Mandatory reporting on setting 2030 targets and status of achievement • Expand mechanisms to encourage active efforts etc.
Small/medium Less than 2,000 m ²		
Area (urban development/energy management)	Local Energy Planning Program (Strengthened) <ul style="list-style-type: none"> • For the development of zero-emission districts, TMG will formulate guidelines and developers will formulate and announce decarbonization policies etc. 	

- Decisively encouraging decarbonization actions by Tokyo residents and businesses

- Further promote Tokyo Zero Emission House at the time of new construction and continuously review the standards
- Promote thermal insulation renovation, expand the use of solar power generation equipment, and encourage switching to energy efficient home appliances at existing houses
- Strengthen efforts to promote a shift to a decarbonized lifestyle
- Promote the installation of self-consumption renewable energy equipment and the procurement of renewable power at businesses
- Promote the decarbonization of small and medium-sized facilities through collaboration with various entities, such as municipalities, financial institutions, and industry organizations

- Promoting the development of zero-emission districts and advanced energy management utilizing digital transformation (DX) in urban development

Mandatory Installation of Solar Power Generation Equipment at New Buildings under Consideration by TMG

For more information, visit the Solar Portal:



Tokyo Solar Portal



Who is required to install solar panels?

- ✓ **The program will cover house builders and other businesses that supply a total floor area of 20,000 m² or more annually in Tokyo.**
- ✓ **Candidates are approximately 50 major house builders in Tokyo.**
- ✓ **The program coverage includes new buildings, not existing ones.**
- ✓ **In this program, suppliers responsible for installation will work together with owners of custom-built houses and purchasers of built-for-sale houses to improve the environmental performance of buildings.**



What are the benefits?



▶ Saving on monthly energy bills

- ✓ Economic benefits of 7,800 yen per month and 93,600 yen per year
⇒ By using the current subsidy of 100,000 yen/kW, you can recover the installation cost of about 980,000 yen in about 6 years!

(This applies when 4 kW is introduced at a detached house with a monthly electricity bill of about 10,000 yen)



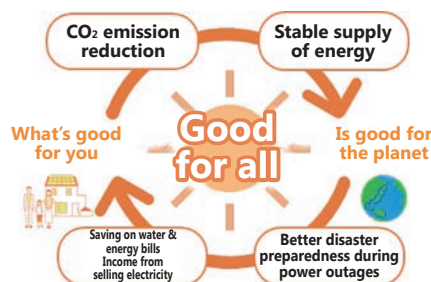
▶ Electricity available during power outages

- ✓ You can collect information and confirm the safety of people on your TV or smartphone in the event of a power outage.
- ✓ You can increase disaster preparedness by adding a storage battery.



▶ Contribution to CO₂ reduction

- ✓ The amount of CO₂ reduced by 4 kW of solar power generation is equivalent to the removal by 2,000 m² of cedar forest, or approximately 200 cedar trees.
- ✓ It also contributes to energy self-sufficiency.



Overseas trends

Efforts toward decarbonization are also expanding in cities overseas.

EU



- ✓ In May 2022, the European Commission announced the details of the REPowerEU plan to break away from dependence on Russia for energy
- ✓ In the European Solar Rooftops Initiatives in the plan, it proposed to mandate the installation of solar power generation equipment at public and commercial buildings and new houses in stages by 2029

Germany



- ✓ The state governments introduced an ordinance mandating the installation of solar power generation equipment
* 7 out of 16 states in Germany have introduced mandatory solar power generation
- ✓ On January 1, 2023, Berlin will mandate the installation of solar power generation equipment at houses

California, USA



- ✓ In 2020, the installation of solar power generation equipment was mandated for all new low-rise houses in the state
* Houses in the shade or without sufficient roof space were exempted from the obligation
- ✓ By 2023, the coverage of the mandatory installation will be expanded to apartment buildings except low-rise ones, in addition to almost all non-residential buildings

New York City, USA



- ✓ A plan to increase the percentage of power generated by renewable energy to 70% by 2030 was approved in 2019
- ✓ In 2019, the installation of solar power generation equipment or greening was mandated for new buildings and those undergoing major roof renovations
* This does not apply in regulated areas or to roofs used for stormwater management, terraces, or entertainment purposes

The metropolis of Tokyo will further accelerate the spread of initiatives focusing on roofs of buildings

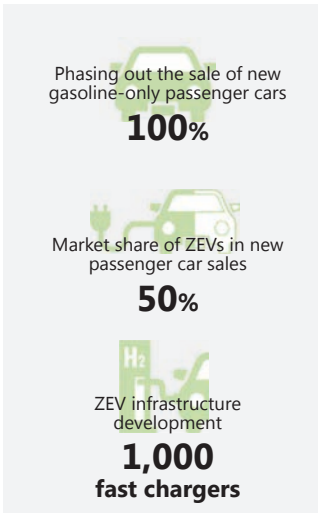
Strategy 1-3: Promoting Zero Emission Mobility



Visions for 2050

- Optimized flow of people and products
- All cars driven in Tokyo to be ZEVs
- Expanded use of renewable energy realizing zero emissions from well to wheel

Main 2030 Targets



Direction of Policies

- Build a mechanism that provides incentives to manufacturers to encourage the expansion of ZEV vehicle types and the reduction of their prices
 - Encourage businesses to introduce ZEVs by for example reviewing the mandatory ratio provided in the Program of the Mandatory Introduction of Low-Emission/Fuel-Efficient Vehicles according to trends in the ZEV lineup
 - Promote the installation of public chargers as a social infrastructure that allows charging while on the go in addition to basic charging at home and office
 - Encourage the spread of battery replacement infrastructure for EV motorcycles, including BaaS*
 - Promote the use of bicycles by developing cycleways and encouraging wide-area bicycle sharing
- * Abbreviation for Battery as a Service which enables the sharing of batteries.



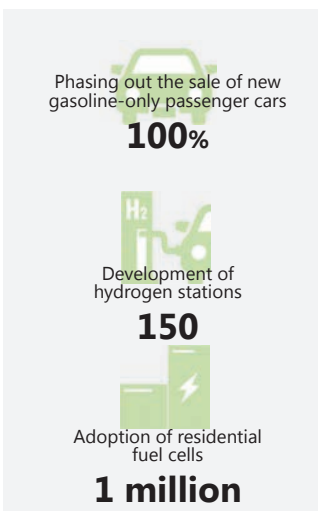
Strategy 1-4: Expanding the Use of Hydrogen Energy



Visions for 2050

- Green Hydrogen serving as a pillar for realizing a decarbonized society
- Support massive introduction and supply of renewable energy with hydrogen
- Make full use of Green Hydrogen in all fields to make it one of the pillars of energy supporting a decarbonized society

Main 2030 Targets



Direction of Policies

- Create cases of utilizing Green Hydrogen to reduce the cost and improve the efficiency of hydrogen production equipment through support for the introduction of the equipment in order to provide a foundation for the use of Green Hydrogen
- Expand the use of commercial fuel cell vehicles and promote the installation of hydrogen stations for the broader use of hydrogen for transportation
- Provide information through Tokyo Hydrogen Vision and the hydrogen information center "Tokyo Hydrogen Museum"

Example of utilizing Green Hydrogen



© Toshiba Energy Systems & Solutions Corporation

Tokyo Hydrogen Museum



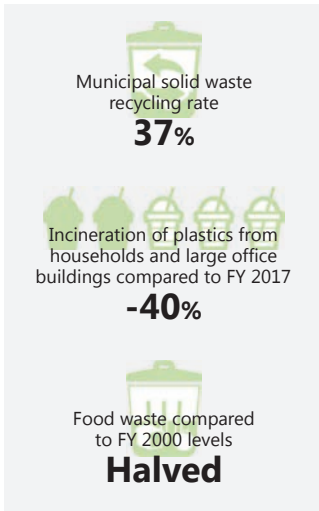
Strategy 1-5: Realizing the Sustainable Use of Resources



Visions for 2050

- Sustainable use of resources established
- Plastic use with net zero CO₂ emissions
- Zero food waste through reduction and food recycling

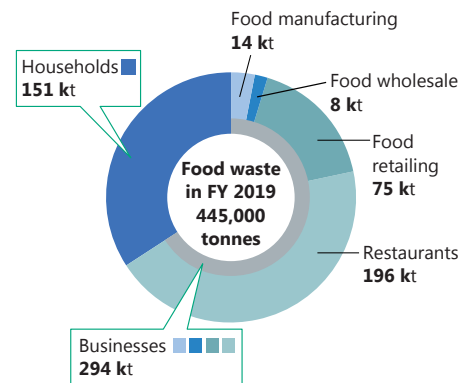
2030 Targets



Status Quo

- Incineration of plastic waste from households and large office buildings amounted to approximately 700,000 tonnes in FY 2019
- Of the total amount of approximately 445,000 tonnes of food waste in Tokyo, approximately 294,000 tonnes were estimated to come from businesses and approximately 151,000 tonnes from households
- An estimate of consumption-based greenhouse gas emissions in Tokyo in 2015 found there was approximately 210 million tonne-CO₂, which is more than 2.6 times that determined on a production basis

Breakdown of food waste in Tokyo



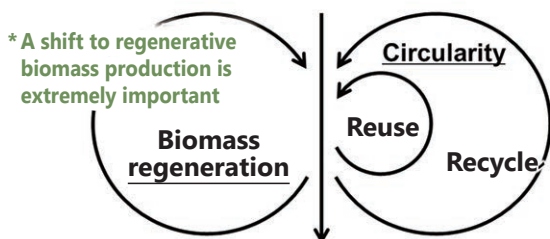
Direction of Policies

A shift to a circular economy to realize the sustainable use of resources and achieve net zero CO₂ emissions

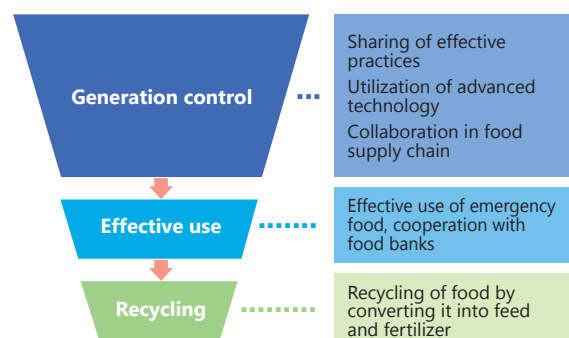
- New ways of using plastics
 - Realize a “carbon closed cycle” with net zero CO₂ emissions by mainstreaming 2R (reduce & reuse) businesses and implementing closed-loop recycling
 - Support the creation of innovations in cooperation with advanced businesses and the recycling of plastics by municipalities
- Measures for food waste
 - Work on the promotion of behavior change of Tokyo residents and businesses, the reduction of food waste using advanced technology, such as AI/ICT, and the effective use of emergency food, and encourage the recycling of remaining food waste by converting it into feed and fertilizer
- Further promotion of 3Rs
 - Encourage the circular use of resources by promoting the recycling of solar panels and the use of eco-materials, exploring how to use biomass resources, and advancing waste treatment with AI/ICT technologies

Concept of circular economy

Reduction and dematerialization of resource consumption Slowing, narrowing



Priority of efforts for food waste reduction



Strategy 1-6: Efforts toward Zero Fluorocarbon Emissions



Visions for 2050

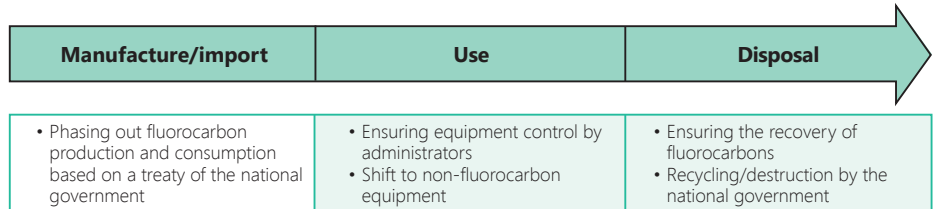
- Zero fluorocarbon emissions
 - Significantly reduce equipment with fluorocarbons by expanding the use of non-fluorocarbon equipment
 - Completely prevent leakage during use and disposal by strictly controlling equipment that contains fluorocarbons

2030 Targets

Hydrofluorocarbons (HFCs) emissions compared to FY 2014
65% reduction
 (Reduced to approx. 1.4 Mt CO₂eq)

Direction of Policies

- Implementing emission reduction measures throughout the life cycle of equipment, from manufacture through use and disposal, in cooperation with the national government and businesses
 - Promote measures for commercial equipment by holding seminars for businesses, utilizing IoT tools and other cutting-edge technologies, visiting demolition sites to give guidance, and expanding the use of non-fluorocarbon products
 - Promote measures for home appliances through crackdowns on illegal recovery operators and other actions



Strategy 1-7: Promoting Climate Change Adaptation Measures



Visions for 2050

- Minimizing risks from climate change impacts
 - Realize a city that protects the lives and property of Tokyo residents as well as continues to attract people and businesses

2030 Targets

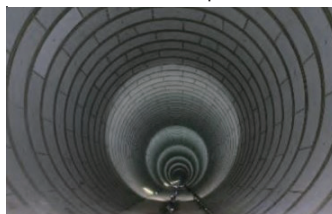
Through the activities of TMG, Tokyo residents and businesses, efforts made in all fields affected by climate change will take into account climate change impacts in the future, incorporating the concept of sustainable recovery and the perspective of digital transformation (DX)

Direction of Policies

- Promoting adaptation measures in a variety of fields, including preparedness for natural disasters, health, the agriculture, forestry, and fisheries industries, water resources and the water environment, and the natural environment
- Collecting and providing information in collaboration with the Tokyo Climate Change Adaptation Center*
- Providing support and advice to municipalities, including support for formulating climate change adaptation plans

* Established in January 2022 to collect, analyze, and provide information on climate change impacts in Tokyo

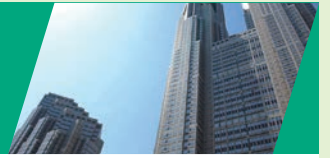
Inside of the Regulating Reservoir under Loop Road No. 7



Smart pole with 5G base stations in Nishi-Shinjuku



Strategy 1-8: Bold Acceleration of TMG's Initiatives for Its Own Sustainability



TMG will take the lead in reform as a large-scale business

● With "Let's Start from Here" in mind, TMG will boldly accelerate its own initiatives to foster the understanding and cooperation of Tokyo residents and businesses

Main FY 2024 Targets

Total installed capacity of solar power generation equipment
20 MW

Percentage of power generated by renewable energy
Approx. 50%

Replacement of TMG-owned vehicles (passenger cars) with non-gasoline counterparts
100%

* Except special-purpose vehicles

Direction of Policies

- Expand the use of renewable energy by for example installing solar power generation equipment at all of the applicable TMG facilities by FY 2030
- Realize zero emission buildings by maximizing the introduction of energy efficiency technology and renewable energy equipment
- Ensure the replacement of TMG-owned vehicles (except special-purpose vehicles) with ZEVs at the time of renewal in principle, upgrading to ZEVs and other non-gasoline vehicles in a systematic manner
- Promote sophisticated plastic recycling, including bottle-to-bottle recycling at TMG facilities

Tokyo Big Sight



Tokyo Metropolitan Archives demonstrating ZEB characteristics



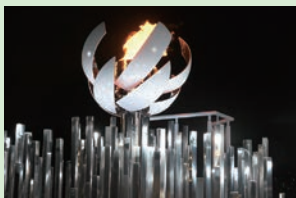
Legacy of Tokyo 2020 Olympic and Paralympic Games



©Tokyo 2020

- Approximately 79,000 tonnes of small home appliances^{*1} and approximately 6.21 million mobile phones^{*2} were collected to make approximately 5,000 medals. 98 podiums were made from 24.5 tonnes of used plastic containers.

*1 Collected by municipalities across the country, including mobile phones
*2 Collected by mobile phone companies



©Tokyo 2020

- At the Tokyo 2020 Games, hydrogen was used for the first time in the history of the Games for the Olympic cauldron and some of the relay torches. Hydrogen was also used at some of the facilities in the Olympic Village. Such hydrogen included that produced with renewable energy in Fukushima Prefecture.

- CO₂ emissions generated by holding the Games were offset, resulting in a carbon-minus event. In addition, efforts were made to reduce Tokyo's CO₂ emissions of 720,000 tonnes to net zero over the four days of the opening and closing ceremonies.



Following the advanced initiatives at the Tokyo 2020 Games, TMG will promote efforts to encourage behavior change among Tokyo residents and businesses and realize a Zero Emission Tokyo.

Strategy 2: Realization of an Environmentally Symbiotic, Prosperous

Visions for 2050

- Respect nature, consider sustainability on a global scale, and aim for an environmentally symbiotic, prosperous society that will continue to benefit from biodiversity

Tokyo's vision for each of the four ecosystem services

A city full of luxuriant nature and living in harmony with creatures

Supporting Services

Serve as the basis for the survival of life, which provides oxygen generation by photosynthesis, soil formation, and nutrient cycling



A city that uses natural resources inside and outside it in a sustainable manner

Provisioning Services

Supply the resources needed for our daily lives, such as food, wood, water, and medicine



A city that enriches life with the blessings of nature

Cultural Services

Provide artistic and cultural inspiration, educational effects, and peace of mind through contact with nature



A resilient city with the functions of nature

Regulating Services

Bring about a safe environment by adjusting the climate, reducing heavy rain damage, and purifying water



Tokyo's vision specific to a metropolis in addition to that for each ecosystem service

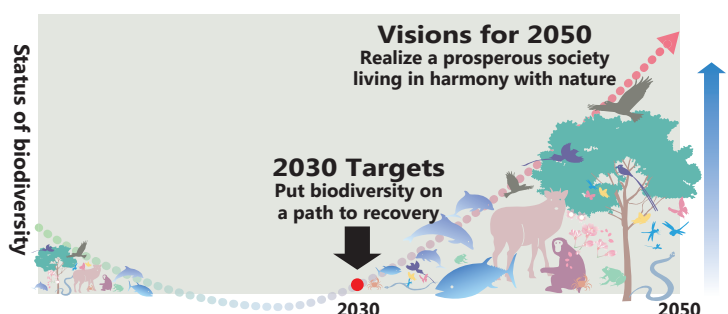
- Conservation and sustainable use of biodiversity established throughout Tokyo
- Behavior changes in place taking account of biodiversity not only in Tokyo but also across Japan and on a global scale

2030 Targets

Achieving a nature-positive framework

Put biodiversity on track to restoration by helping all entities that aim for an environmentally symbiotic, prosperous society work together to promote the conservation and sustainable use of biodiversity

Image of achieving a nature-positive framework





2030 Targets

Biodiversity upgrade areas:

10,000+

* Private sector efforts, such as OECM (Other Effective area-based Conservation Measures), are expressed as "+ (plus)" so that the target can be pursued together with various entities.



Zero Wild Extinction Action



Promotion of

Tokyo-NbS Action

Tokyo as a city supported by nature

* NbS is an abbreviation for Nature-based Solutions.



Biodiversity Actions Taken by

All Tokyo Residents

Individual's Actions Change Society

Direction of Policies

● Promoting the conservation and recovery of biodiversity, handing down the luxuriant nature of Tokyo to future generations

- Conserve local ecosystems and habitats for a variety of living things through the conservation and expansion of important natural land, creation of greenery, and improvement of its quality
- Promote the conservation of rare wild fauna and flora, and measures for alien species
- Build appropriate relationships between humans and wildlife through proper protection and management of wildlife
- Collect, store, and provide information on the natural environment for the appropriate conservation and raising awareness of local nature

Chloris sinica kittlitzii (a rare species)



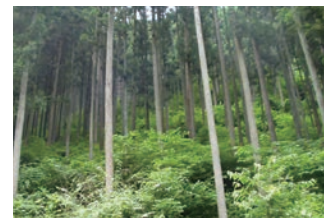
Satoyama conservation area, Takiyama, Hachioji



● Using the blessings of biodiversity in a sustainable manner, utilizing the functions of nature to improve the lives of Tokyo residents

- Use Tokyo's natural bounty, such as wood, agricultural products, and marine products
- Promote green infrastructure that contributes to disaster prevention and mitigation, including appropriate management of forests and drainage or storage of rainwater
- Utilize nature in ways that lead to a more comfortable and enjoyable life, creating opportunities for health promotion and education that make use of natural resources, and preserving and passing on history and culture

Forest properly managed by thinning



● Recognizing the value of biodiversity, changing that idea into actions that address global issues as well as those in Tokyo

- Provide information on the value and importance of biodiversity to deepen understanding of and interest in biodiversity among all entities
- Promote environmental education and human resource development in the field of the natural environment to retain people who will protect and sustainably use nature, and to encourage behavior change
- Promote behavior change, such as consideration of biodiversity in economic activities and consumption behavior, which will consider and contribute to not only the environment of Tokyo but also the global environment

Development of environmental human resources



Experiencing rice threshing in satoyama conservation area



* The development of initiatives related to biodiversity will be consistent with the Tokyo Local Biodiversity Strategy that is being formulated as of September 2022.

Strategy 3-1: Further Improving Air Quality Etc.



Visions for 2050

- The highest level of air quality achieved among large cities around the world
- Dangerous building materials with asbestos remaining in buildings managed and treated properly to prevent dispersion into the air
- Noise and vibration problems resolved to improve the comfort of the lives of Tokyo residents

Main 2030 Targets

PM2.5: Annual average of **10 $\mu\text{g}/\text{m}^3$ or less** over all monitoring stations

Photochemical oxidant concentration: **Less than 0.07 ppm** (fourth-highest daily maximum, averaged across three consecutive years, averaging time unit of eight hours)

Number of days for photochemical smog advisories issued: **Zero**

Direction of Policies

- Air quality
 - Develop initiatives from a wide range of perspectives: Measures to reduce emissions of NOx and VOCs that are the causative agents of PM2.5 and photochemical oxidants as well as monitoring, research, and wide-area cooperation
- Asbestos
 - Cooperate with municipalities to enhance measures taken at the demolition stage in normal times and those to prevent dispersion from collapsed buildings in the event of a disaster
- Noise and vibration
 - Identify their sources through steady data collection, promote measures in cooperation with businesses and municipalities, and provide detailed information to Tokyo residents

Overhead fuel dispensers with high VOC emission reduction effect



On-site guidance on asbestos



Aircraft noise measurement



Strategy 3-2: Reducing Risks Caused by Chemical Substances Etc.



Visions for 2050

- Minimized risks to the health of Tokyo residents due to the release of chemical substances
- Sustainable measures selected for soil pollution, and information, such as the concentration of hazardous substances in soil or groundwater, shared and managed by society as a whole

2030 Targets

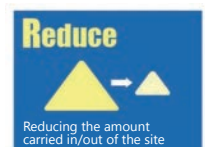
Chemical substances: Concentration of chemical substances in the environment is sufficiently reduced below environmental target values

Soil pollution: Measures for soil pollution subject to laws and ordinances take into account the 3Rs of soil, and information reported on soil and groundwater is shared throughout society

Direction of Policies

- Chemical substances
 - Promote proper management and measures to prevent outflow in the event of a disaster, and reduce the risk of chemical substances through monitoring and prompt data disclosure
- Soil pollution
 - Establish in society measures for soil pollution that consider the 3Rs of soil, and promote support, awareness raising, and improvements in programs so that businesses can choose rational action
 - Ensure traceability, including the management of smooth land use and land with nonconforming soil, through the open data methodology

3Rs of soil



Strategy 3-3: Further Promoting the Proper Treatment of Waste



Visions for 2050

- Minimized environmental risks from hazardous waste with no illegal dumping of industrial waste
- Preparedness in normal times for quickly and appropriately treating waste caused by a disaster, such as a Tokyo inland earthquake

2030 Targets

Amount of municipal solid waste:

410 million tonnes

Final disposal volume:
770,000 tonnes

Build a system to quickly and appropriately treat disaster waste throughout Tokyo

Direction of Policies

- Strengthening the waste treatment system
 - Strengthen the waste treatment system in normal times by for example thoroughly implementing measures for hazardous waste and illegal dumping
- Strengthening measures for disaster waste
 - Provide training related to disaster waste treatment in cooperation with municipalities, implement necessary support measures, and promote the formulation of a plan for disaster waste treatment
 - Develop a wide-area treatment system in collaboration with neighboring local governments in preparation for a large-scale disaster

Roadside survey to prevent illegal dumping



Cross-Sectional and Comprehensive Initiatives to Enhance the Effectiveness of Policies



Collaboration with Tokyo Residents, Businesses, etc.

- Promote project development in collaboration with Tokyo residents, businesses, and organizations, provision of information on ambitious activities and excellent case examples, retainment and development of human resources, and behavior change
- Support the creation of advanced technology and business models by businesses, and utilize AI and other digital technologies

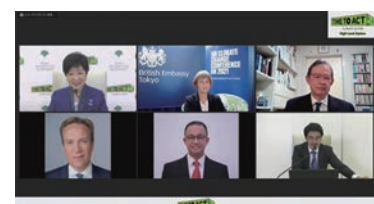
Tokyo Cool Home & Biz Event held to call for acceleration of power-saving actions



Collaboration between Local Governments, TMG's Initiatives for Its Own Sustainability

- Support proactive efforts by municipalities, such as those toward decarbonization according to local characteristics
- Take the initiative by for example promoting the Zero Emission TMG Action Plan

CLIMATE ACTION FORUM 2021



International Contribution and Exchange

- Enhance cooperation with overseas cities and businesses by actively participating in international intercity network activities, such as C40 and ICLEI, and international conferences
- Strategically develop the climate action movement "TIME TO ACT" from Tokyo

Promotion of Environmental Consideration in Urban Development

- Promote sustainable urban development through the steady implementation of the Environmental Impact Assessment System



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For more information on the
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