Toward a 2030 Carbon Half and the Future Beyond

Zero Emission Tokyo

Committed to 1.5°C

Zero Emission Tokyo Strategy Beyond Carbon Half



The historic **Paris Agreement was signed 10 years ago**. The decade that followed has been marked by turbulence and transformation. The world has faced the escalating climate crisis, energy shortages, natural disasters, and global health emergencies. At the same time, rapid advances in cutting-edge technologies such as artificial intelligence, as well as shifting dynamics in the international community, have continued to reshape our global landscape.

In 2024, the **global average temperature reached the highest ever recorded, surpassing even the record set just the previous year**. For the first time in a single year, the global temperature rise exceeded 1.5°C. We are no longer merely facing global warming, **we are entering an era of global boiling**. The urgency is undeniable—there is no time to waste.

To meet the **1.5°C target** set by the international community, global CO_2 emissions must be net zero by 2050. **That future is not distant, it is just 25 years away, a single quarter of a century**.

We are committed to **making Tokyo even better than it is now** by transforming the essentials of daily life—food, clothing, and shelter—into foundations that are safe, secure, sustainable, and thriving. The future depends on the **strategies and actions of those of us living in the present**.

To achieve zero emissions by 2050, the Tokyo Metropolitan Government (TMG) has set a new target of **reducing greenhouse gas emissions by at least 60% by 2035 compared to 2000 levels**, with an eye to a 2030 Carbon Half and beyond.

The Zero Emission Tokyo Strategy Beyond Carbon Half shows the visions for 2050 and a clear path to 2050. To achieve the 2035 greenhouse gas emissions reduction target, we have set **31 individual targets** to promote effective initiatives.

Starting in April this year, **TMG will mandate the installation of solar power generation equipment at new houses and buildings for the first time in Japan**. We are committed to realizing a **decarbonized city that acts as a model for the world** by strategically making every effort, such as making renewable energy a major energy source, maximizing energy efficiency, implementing hydrogen energy in society, and strengthening adaptation measures.



We are now at the threshold of a new era. The **climate action of each and every one of you** is the driving force that will open the door to a **brighter future for all**.

Beyond Carbon Half—Let's act as key players in a Zero Emission Tokyo and lead the way to a more sustainable and hopeful future.

March 2025

Governor of Tokyo, KOIKE Yuriko










Zero Emission Tokyo Strategy Beyond Carbon Half

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01

CHAPTER 01

TRENDS IN CLIMATE CHANGE AND ENERGY

An Opportunity to Increase Urban Resilience and Competitiveness

The alarm bells of the climate crisis are ringing louder than ever, with our daily lives increasingly under threat

From Crisis to Emergency

Have you noticed more frequent extreme weather—torrential rains, life-threatening heat waves? Climate change is rapidly turning into a full-blown emergency, pushing our everyday lives to the brink.

Climate change has already caused these effects:



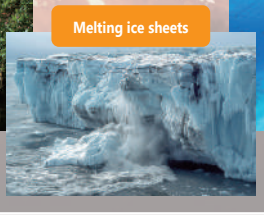


Increase in various risks:











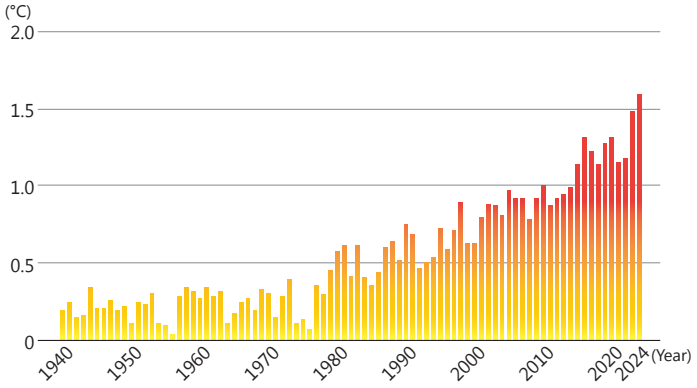


Rising temperatures put everyday life at risk and their impact is serious.

- UN Secretary-General Guterres drew attention to a critical situation, saying, "The era of global warming has ended. The era of global boiling has arrived."
- The annual average temperature of the Earth has already risen by 1.1°C*. To meet the 1.5°C target that the world is aiming for, it is necessary to further accelerate efforts to halve global CO_2 emissions by 2030 and make them net zero by 2050.
- In 2024, the global average temperature reached a record high for the second consecutive year, surpassing 1.5°C for the first time within a single year. We are now at a critical turning point.

* The average of 2011 to 2020

Difference between the average temperature before the Industrial Revolution (1850-1900) and the temperature of each year



Source: Data published by the Copernicus Climate Change Service

Why 1.5 °C?

The 2015 Paris Agreement set a goal of limiting temperature increase to well below 2ºC above pre-industrial levels and pursuing efforts to limit it to 1.5ºC above pre-industrial levels.

Efforts are now underway to keep the global temperature rise within the 1.5ºC threshold.

The climate crisis is here—Act now before the window of opportunity closes

Climate change is progressing at an abnormally fast pace. If we fail to act, our current way of life could be lost forever

Life in the Future with the Climate Crisis Accelerated—Four Seasons Turning into Two?!

- The world will change dramatically if climate change accelerates. We may be forced to face this new world in the near future.
- Whether we can continue with the everyday life we now take for granted depends on us, no one else.

Active mosquitoes in October



As average temperature in October exceeds 25°C, tiger mosquitoes will be active, increasing the risk of infectious diseases.

No snow



Snowfall will decrease by up to 70%, possibly resulting in no winter scenery while the number of days with extremely heavy snow will increase, affecting daily life.

No sports played



Exercise in the intense heat of summer will become difficult. We will have fewer days when we can play sports outdoors.

Average temperature rise will reach **1.5°C** before 2030.

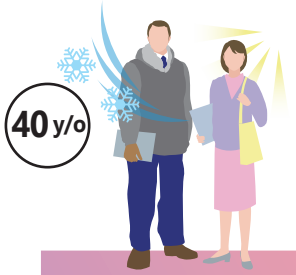
How will winter clothing change?



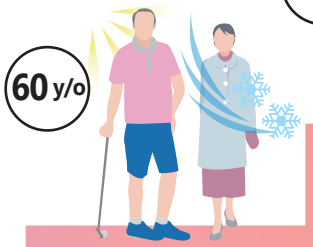


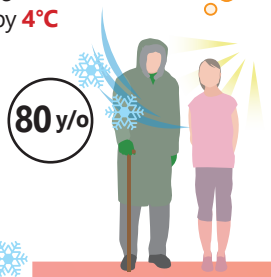


Average temperature will rise by approximately **2°C** around 2050.



Average temperature might possibly rise by **4°C** or more by 2100.





Short sleeves today, down jacket tomorrow?

2025

2030

2035

2050

2070

2090

Highest temperatures in summer

Over 40°C will be the norm?!

Changes in sushi toppings



As sea temperatures rise, there is a risk that fish and shellfish including salmon roe and scallops will no longer be able to live in the waters near Japan.

No cherry blossoms blooming



There may be years when we can no longer enjoy cherry blossom season, as the lack of cold days prevents the trees from flowering.

Disappearing beaches



Rising sea levels threaten to erase up to 90% of Japan's sandy beaches, making swimming impossible.

Food shortages and price hikes



Poor crop growth will lead to reduced harvests. An increase in disasters will also result in higher food prices.

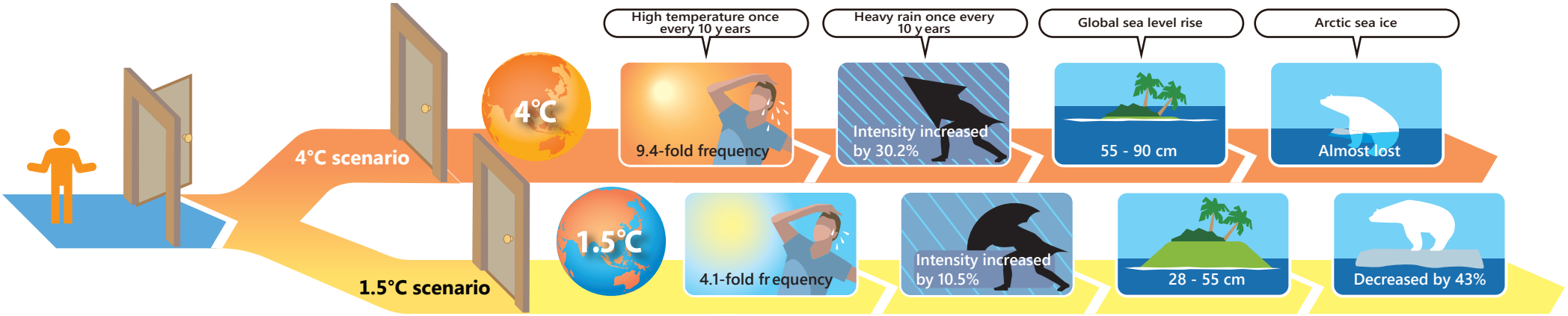
The above data and simulations are based on materials from the Ministry of the Environment, the National Institute for Environmental Studies, and the Tokyo Climate Change Adaptation Center. Predictions are shown for the future up to around 2100.

Young people who are 15 today will be 40 years old in 2050. The year of 2050 is not a distant future

It is our responsibility to choose a “future scenario” with a smaller impact

We cannot avoid climate change impacts that have already occurred. However, we can prevent them from getting any worse.

- As the impacts of rising temperatures are already apparent in our everyday lives, we need to take adaptation measures for these impacts and minimize the risks.
- Our future will change dramatically depending on how much the temperature rises in the future. For ourselves and for young people and children who will live in the future, we must not give up on our efforts to limit temperature increase to below 1.5°C—Let’s choose this better scenario.



Topic

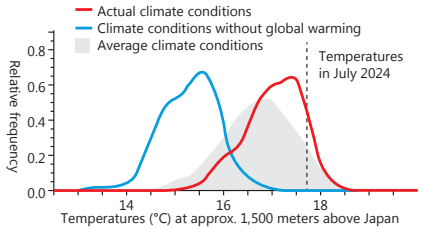
Scientific Proof: Climate Change Affects the Occurrence of Abnormal Weather

There has been progress in event attribution research which quantitatively analyzes how much global warming has affected each abnormal weather event

- It has become clear that human-induced global warming has increased the frequency of extreme heat and caused an increase in rainfall.

Example **Record high temperatures in July 2024**

Probability of high temperature events occurring in July 2024

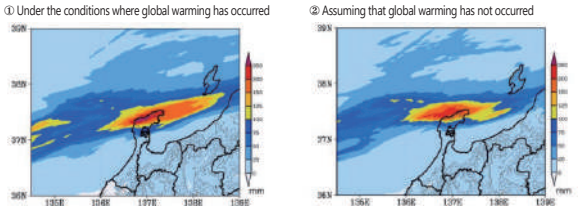


The probability would be **almost 0%** without global warming.

Source: “Global Warming Contributed to the Record High Temperatures and Heavy Rains in the Summer of 2024,” Ministry of Education, Culture, Sports, Science and Technology

Example **Heavy rains in Noto, Ishikawa Prefecture in September 2024**

Simulations of heavy rains from September 21 to 22, 2024



Total rainfall **increased by approximately 15%** due to global warming (calculated based on the difference between ① and ②)

Source: “Global Warming Contributed to the Heavy Rains in Noto, Ishikawa Prefecture in September 2024,” Ministry of Education, Culture, Sports, Science and Technology and Meteorological Research Institute, Japan Meteorological Agency

The industrial structure is undergoing a major transformation focusing on decarbonization. An integrated strategy that ensures both decarbonization and energy security is essential

Decarbonization and energy security are directly tied to corporate competitiveness

- The industrial structure that supports our lives is also at a major turning point due to the emergence of generative AI and other issues. It is expected that a shift to an electricity-oriented global economy will be advanced as the economy is digitalized, as shown by the implementation of autonomous driving and the use of robots in a super-aging society.
- As global trends in energy and resources undergo major shifts, companies and organizations are increasingly investing in decarbonized energy as a core business strategy.

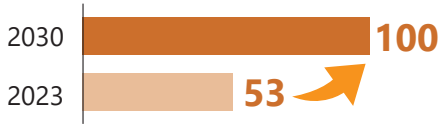
The digital transformation market including generative AI is expected to expand rapidly

Global market forecast for generative AI (in $10 billion)



Source: "2024 Information and Communications White Paper," Ministry of Internal Affairs and Communications

Global market forecast for semiconductors (in $10 billion)



Source: "2024 Semiconductor Strategy for Strengthening International Competitiveness," JEITA Semiconductor Committee


Autonomous driving

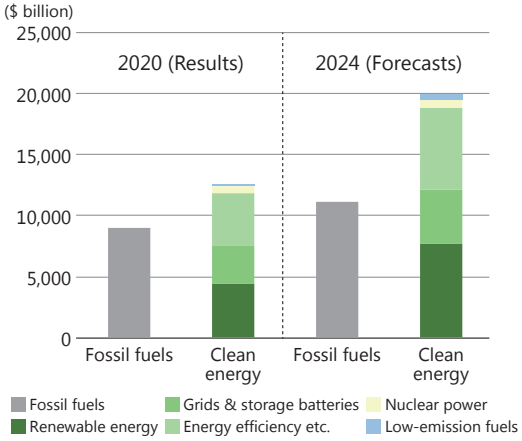

Smart factory/robotics


Wearable/XR


Data center

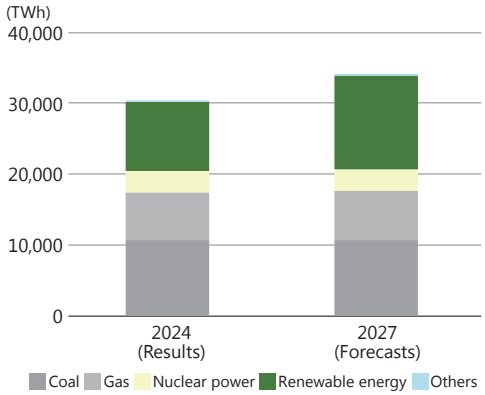
Investment in decarbonized energy will advance worldwide

Investment in renewable energy and energy efficiency will increase



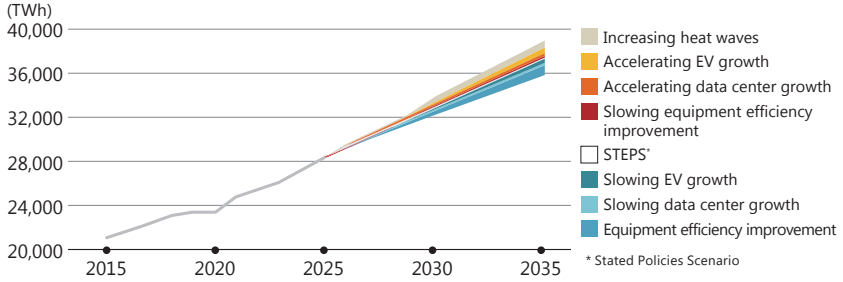
Source: "World Energy Investment 2024," IEA

The share of renewable energy as a power source in global power generation will increase



Source: "Electricity 2025," IEA

Global power demand will increase at approximately 3% per year



Source: "66th Meeting of the Strategic Policy Committee of the Advisory Committee for Natural Resources and Energy," Ministry of Economy, Trade and Industry

Growing number of companies place importance on decarbonization throughout the supply chain

Number of RE100 member companies

Companies aiming to power their entire operations with renewable electricity

14 March 2015 → **443** including 91 Japanese companies March 2025

Source: RE100 website

Number of SET member companies

Companies aiming to reduce supply chain emissions

17 March 2015 → **7,705** including 988 Japanese companies March 2024

Source: "SBT Outline," Ministry of the Environment



Some companies ask their partners to use renewable energy

Decarbonization has become a core part of corporate management strategies, as evidenced by Apple and Sony Group asking their business partners to use only renewable energy by 2030.

Decarbonization strategies provide an opportunity to enhance urban resilience and industrial competitiveness

In an era of growing uncertainty—driven by the accelerating climate crisis, shifting industrial structures, and evolving international dynamics—it is the fundamental mission of cities to protect the lives and property of their citizens. To achieve sustainable growth, cities must generate jobs and foster innovation by maximizing energy efficiency, deploying renewable energy, and expanding the use of Green Hydrogen. Across the globe, cities are leading the way toward a sustainable future through bold decarbonization strategies—building economies and societies that are not only resilient, but that thrive in harmony with the environment.

IPCC* * UN Intergovernmental Panel on Climate Change

Preparing a Special Report on Climate Change and Cities



Europe

The EU is developing a new industrial strategy to enhance international competitiveness by supporting the introduction of low-carbon technologies to energy-intensive industries

Paris

Is advancing initiatives that will help renovate 40,000 homes per year by 2030 through subsidies for apartment buildings in order to minimize energy consumption throughout all existing buildings by 2050 based on the 2024-2030 Climate Action Plan

London

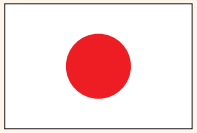
Has launched a Climate Finance Facility to raise billions of pounds to address air pollution and climate change and strengthen competitiveness

Berlin

Is promoting 80 circular economy initiatives focused on reducing and reusing waste, and providing support to companies for energy efficiency, resource efficiency, and climate protection measures

Japan

Has formulated the Green Transformation* 2040 Vision to simultaneously achieve stable energy supply, economic growth, and decarbonization



Australia



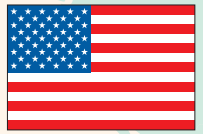
Is advancing initiatives such as tax deductions and subsidies to offset the cost gap in hydrogen production so as to promote Green Hydrogen and stimulate domestic demand

New South Wales

Under its hydrogen strategy, NSW is investing AUD 3 billion in incentives to develop a skilled workforce and establish the industrial foundation needed to support a thriving Green Hydrogen sector

USA

The US administration announced its withdrawal from the Paris Agreement. In response, 24 states and territories declared that they will continue their efforts to achieve the goals of the Paris Agreement



New York City

Is planning to create 400,000 jobs by 2040 focusing on green jobs, develop a workforce skilled in solar panel installation, and encourage innovation in collaboration with startups

California

Aiming for a complete shift to clean energy by 2045, California is facilitating the construction of solar and wind power facilities, along with storage batteries, through large-scale investments totaling USD 180 billion

* A shift aimed at minimizing the use of fossil fuels by transitioning to clean energy sources, alongside the actions needed to make this transformation a reality

Tokyo is striving to become a green and resilient global city, pioneering a future that is sustainable, safe, secure, and comfortable for all



02

CHAPTER 02

UPDATING THE ZERO EMISSION TOKYO STRATEGY
Zero Emissions Will Make Tokyo Even Better



Now is the turning point toward the 1.5°C target
—Each individual is a key player in leading the way to a new era

The Time Has Come to Choose the Future
Zero Emissions Will Make Tokyo Even Better

- Climate change measures are a **survival strategy**, but also a **growth strategy** that dramatically increases cities' potential.
- TMG is committed to protecting the lives and livelihoods of Tokyo residents, transforming all of food, clothing, and shelter into sustainable and prosperous ones, and enhancing the city's resilience.
  Zero emissions are an **action to upgrade Tokyo to an even better sustainable city**.
- **Toward 2050 Zero Emissions**: Now is the time to accelerate action again with an eye ahead **2030 Carbon Half** and 2035 beyond that.
- We have 25 years until 2050 and we can dramatically change the future. **Each one of us is a key player in a Zero Emission Tokyo**.

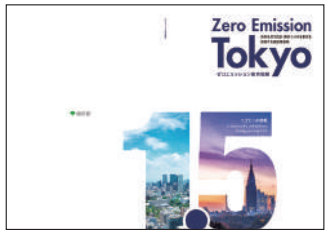
Beyond Carbon Half,
TMG is committed to leading the way to a brighter future through effective initiatives

Having led the way in decarbonization, Tokyo shows its vision and new path toward zero emissions

To achieve the goal of 2050 Zero Emissions, Tokyo has accelerated efforts to realize a 2030 Carbon Half

- TMG declared its commitment to contributing to achieving net-zero CO_2 emissions worldwide by 2050, **called for TIME TO ACT both at home and abroad, and launched decarbonization actions**
- **Clarified paths to ensure Carbon Half**, as shown by **strengthening building-related programs** that shape the city and **implementing support measures**

FY 2019



Zero Emission Tokyo Strategy

2050 Zero Emission Declaration

FY 2020



2020 Update & Report

Announcement of 2030 Carbon Half

FY 2021



Accelerating initiatives for 2030 Carbon Half

Presenting efforts to be strengthened toward Carbon Half

FY 2022



Establishing a new program to improve the environmental performance of new houses and buildings

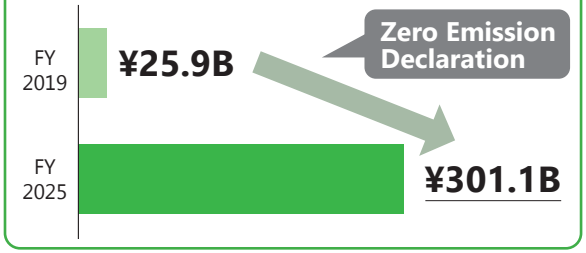
Developing support measures for implementation

FY 2025

Implementing the new program

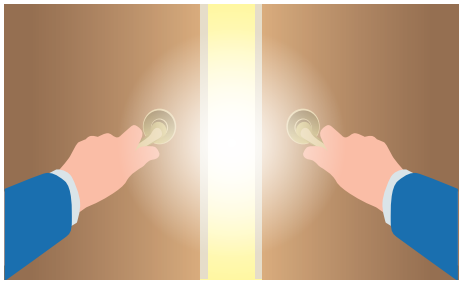


Zero emission-related budget increased more than tenfold

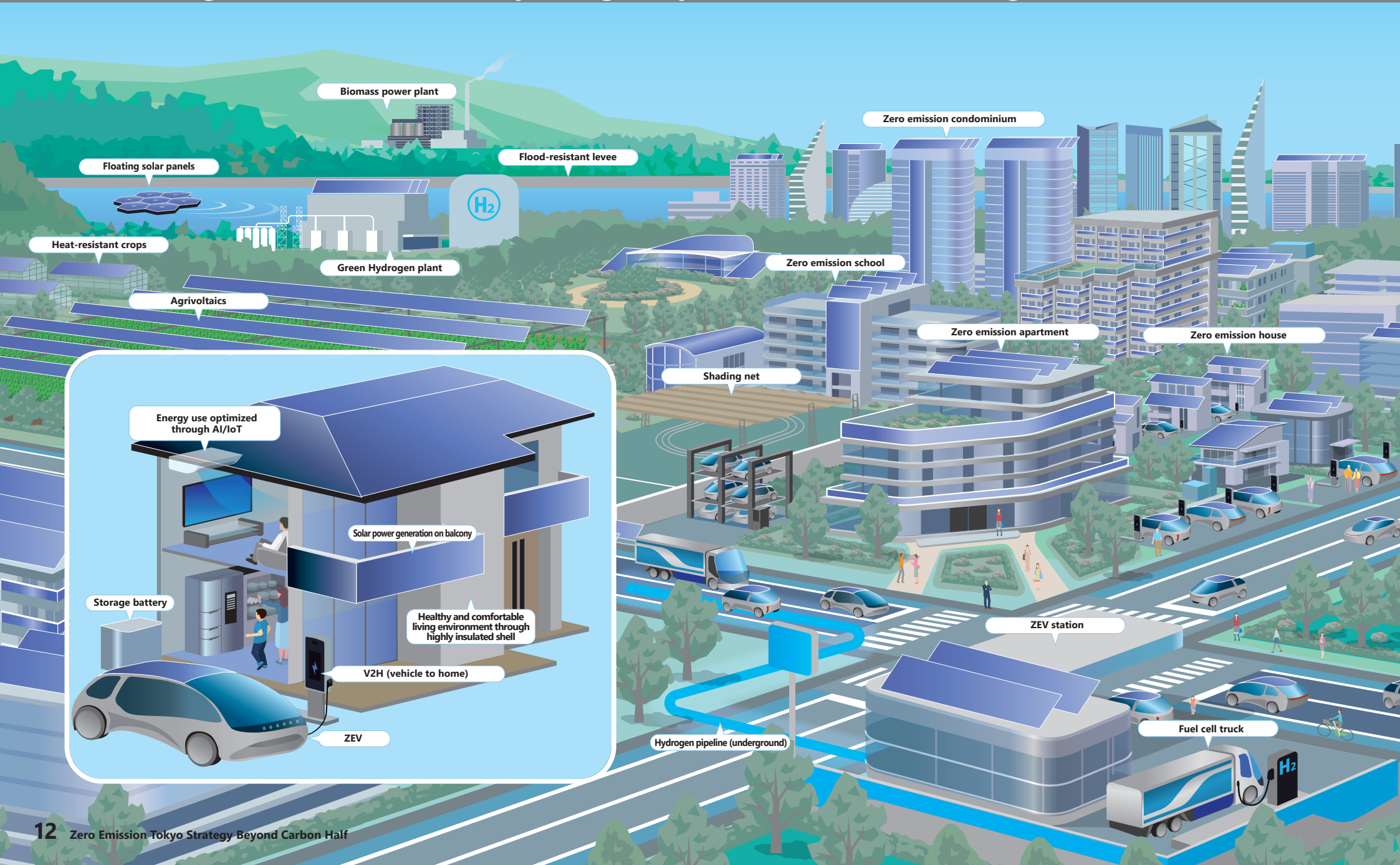


Time to open a new door toward 2050—Beyond Carbon Half

- **Society is undergoing rapid transformation**, marked by the worsening climate crisis, deepening structural challenges in resource and energy supply, and the explosive evolution of generative AI and other emerging technologies.
- TMG must **harness these changes as opportunities**—mobilizing its full strength to protect the lives and livelihoods of Tokyo residents, while steering the city toward a **development path** that enhances its global competitiveness.
- TMG will accelerate its initiatives, using climate action as a **catalyst for bold progress**, by sharing its visions for 2050 and charting a new course beyond Carbon Half.

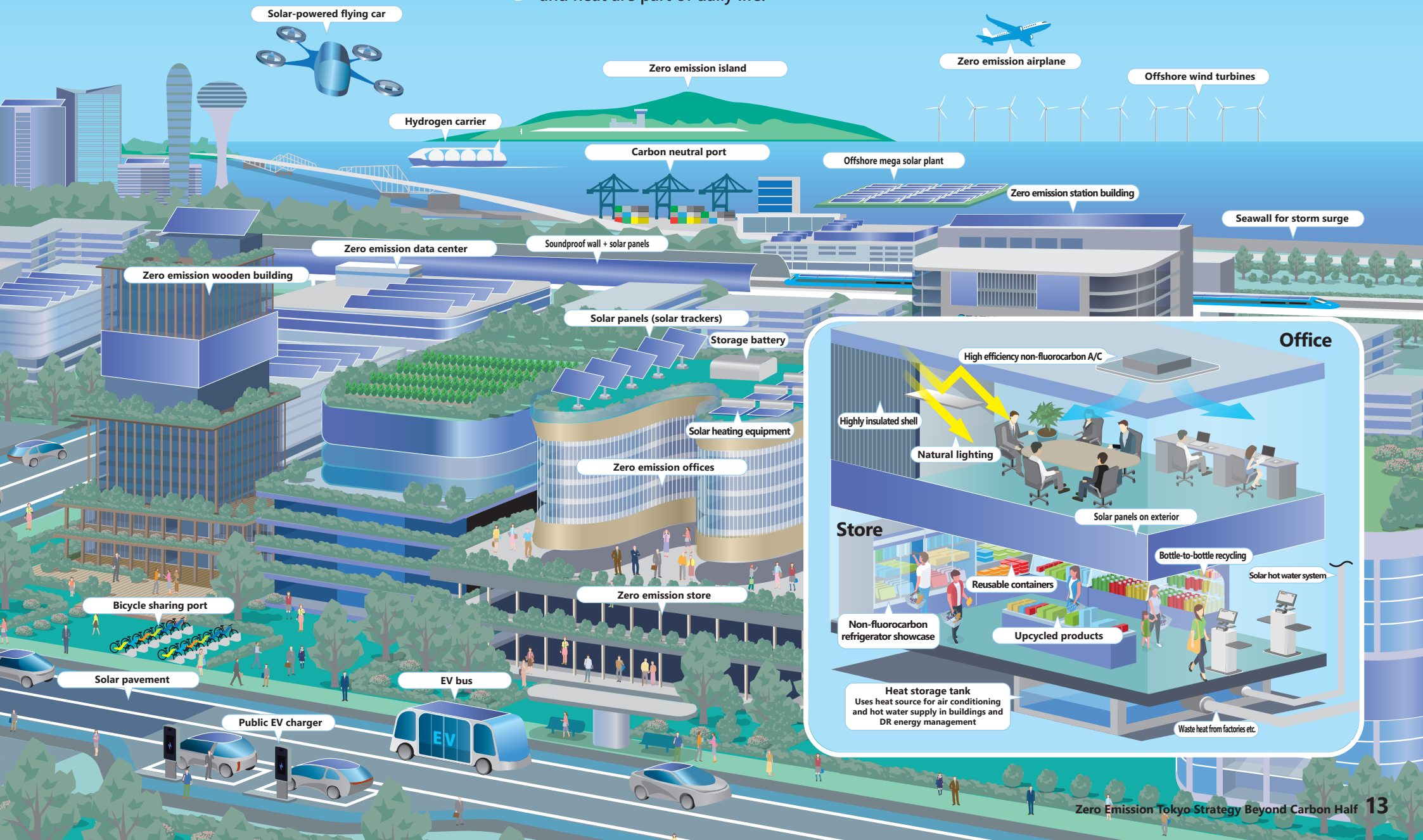


Vision for 2050
- Realizing a decarbonized society that greatly contributes to achieving net zero worldwide



Imagined Community in 2050

Here is a vision of a green and resilient Zero Emission Tokyo:
A power-generating future city where energy efficiency is maximized and renewable energy is deployed across all areas;
Where Green Hydrogen is effectively utilized and resources are recycled with minimum waste;
And where clean air and water, environmental symbiosis, and strong resilience to climate-related disasters and heat are part of daily life.



New milestone toward 2050 Zero Emissions—Policy goals for 2035

Tokyo is setting a new interim target for 2035, paving the way beyond Carbon Half

- Reduce greenhouse gas emissions by at least 60% by 2035 compared to 2000
- Accelerate emission reductions as a major consumer of energy and resources, aiming to meet a level* expected by the international community

* Level aligned with the 1.5°C target required by IPCC (UN Intergovernmental Panel on Climate Change)

Greenhouse gas emissions compared to 2000

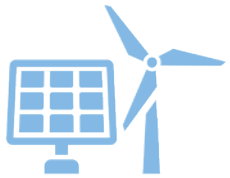


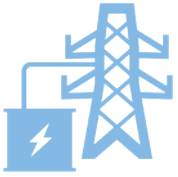
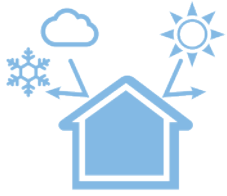
At least 60% reduction



Set 31 individual targets and promote effective initiatives in all fields to achieve the 2035 greenhouse gas emissions reduction target

Making Renewable Energy a Major Energy Source & Expanding Zero Emission Buildings

Energy consumption compared to 2000	Percentage of power generated by renewable energy	Installation of solar power generation equipment	Installation of next-generation solar cells	Installation of offshore wind turbines
				
At least 50% reduction	60% or more	3.5 GW	Approx. 1 GW	1 GW or more

Installation of residential storage batteries	Installation of grid storage batteries (in TEPCO's service area)	Number of high efficiency water heaters installed	Households with thermal insulation retrofits	SMEs with energy efficient equipment
				
3.5 GWh	400 MW	4.54 million	3.85 million	10,000

Promoting Zero Emission Mobility

Market share of non-gasoline vehicles in new car sales



Maintain 100% for passenger cars
100% for motorcycles

Number of EV buses introduced



1,300

Number of EV trucks introduced



70,000

Public fast chargers



2,000

Chargers at apartment buildings



120,000

Expanding the Use of Hydrogen Energy

Establishing a Green Hydrogen supply system



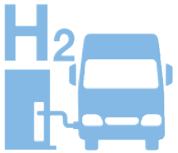
Establishing a supply system at home & abroad

Number of fuel cell commercial vehicles introduced



Approx. 10,000

Number of hydrogen stations for commercial vehicles



Approx. 100

Collaborating with All Entities & Building the Foundation for Realizing a Zero Emission Tokyo

Promoting international collaboration



Further promoting collaboration with overseas cities to address global environmental issues

Encouraging behavioral change within companies



Decarbonization management accelerates CO_2 reduction in the commercial sector. Increasing circulation of green products in the market, driving sustainable choices among consumers

The share of sustainable investment balance held by Japanese institutional investors etc. (global percentage)



15% or more

Shift to a Circular Economy & Measures for Fluorocarbons

Municipal solid waste recycling rate



Approx. 40% (guideline)

Incineration of plastic waste compared to FY 2017



50% reduction

Food waste compared to FY 2000



65% reduction

Fluorocarbon emissions compared to 2014



70% reduction

Promoting Climate Change Adaptation Measures

Number of cooling shelters installed



3,000

Construction of heat blocking pavements etc. on Tokyo metropolitan roads



Approx. 270 km

Concentration of particulate matter (PM2.5)



Continuing annual average of 10 μ/m³ or less over all monitoring stations

Concentration of photochemical oxidants



0.07 ppm or less at all monitoring stations

TMG's Initiatives for Its Own Sustainability

Total amount of solar power generation introduced at TMG facilities



74 MW + Approx. 10 MW of next-generation solar cells etc.

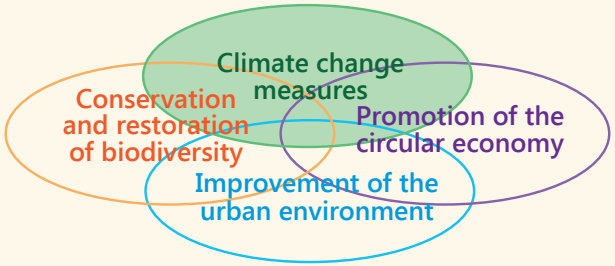
Promoting effective initiatives based on the three principles and five approaches to create a sustainable future

The Three Principles for Zero Emissions

01 With increased synergy, decarbonization will contribute to solving various social issues simultaneously

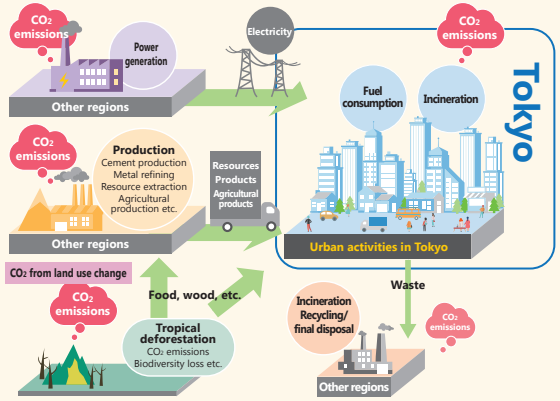
- There are synergies, trade-offs, and other interconnections between the fields of climate change, biodiversity, sustainable resource management, and air quality.
- Through efforts across these fields, TMG will maximize synergistic effects to provide simultaneous and cost-effective solutions to the multiple challenges Tokyo faces, promoting a shift to a sustainable socio-economic system.

Sustainability through interconnections between fields



02 Tokyo is committed to taking the lead in decarbonization efforts and contributing to the reduction of CO_2 emissions both at home and abroad

- Much of the energy and resources consumed in Tokyo is produced and disposed of in areas outside the city, meaning that a significant portion of CO_2 emissions tied to Tokyo's urban activities occur in other regions.
- Recognizing the benefits it receives from other regions, Tokyo will work to reduce greenhouse gas emissions and biodiversity loss throughout the supply chain through sustainable production and consumption.
- Tokyo will reinforce collaboration at home and abroad by sharing advanced initiatives and implementing joint projects, and build win-win relationships with other regions to pave the way for the next era.



03 All entities will come together and take action to achieve decarbonization

- Great results can be achieved when various entities come together, bring their respective resources, and act together.
- Tokyo will achieve the transformation to a decarbonized society by bringing together all stakeholders, including public authorities, Tokyo residents, companies, and NGOs, integrating their wisdom and technology, and stepping up action to overcome the climate crisis.



The Five Approaches to Enhance the Effectiveness of Initiatives

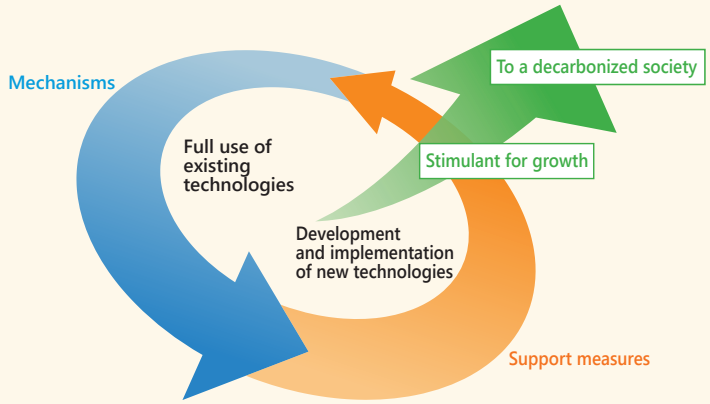
01 Developing approaches across initiatives

- Promoting "multiplicative" efforts with synergistic effects to cause positive spillover effects
- Comprehensively developing mitigation and adaptation measures for a safe, secure, and affluent life



02 Guiding society with mechanisms and support measures toward decarbonization

- Speeding up the transformation to a decarbonized society through the mechanisms and support measures—Using this momentum as a stimulant for growth

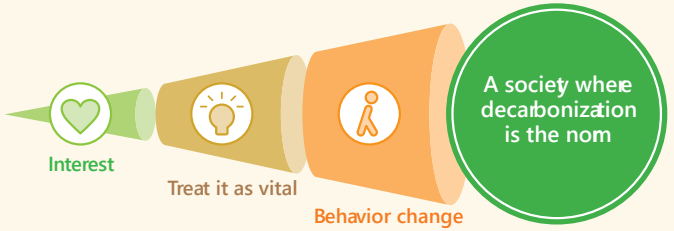


03 Fully using existing technologies and quickly implementing new technologies using digital transformation

- Using existing excellent decarbonization technologies to the fullest for their widespread adoption in everyday life
- Beginning to implement forward-looking decarbonization technologies to build a solid foundation for future breakthroughs

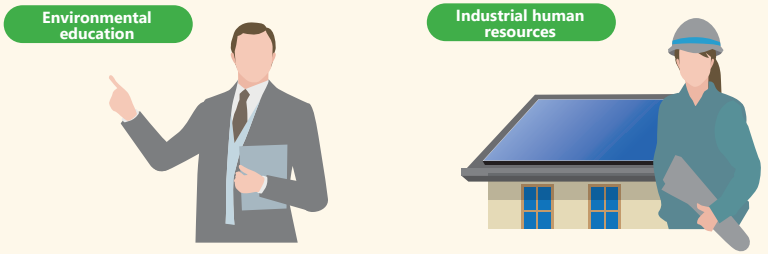
04 Promoting behavioral change through strategic mechanisms

- Encouraging each individual to recognize the importance of decarbonization and adopt more sustainable behaviors
- Promoting digital transformation and other social system reforms to embed decarbonization into everyday practice



05 Developing human resources and industries for a decarbonized society

- People are the driving force behind shaping the future
- Building a bridge to a sustainable future by developing those who will take the lead in achieving zero emissions



Updating the Zero Emission Tokyo Strategy toward 2030 Carbon Half and the future beyond

- Centered on 10 core policies, the Zero Emission Tokyo Strategy Beyond Carbon Half outlines Tokyo's key targets for 2035, building on the 2030 Carbon Half milestones. It defines the direction for intensified action and major efforts needed to achieve the targets. The strategy also features priority projects to be focused on in particular, urging accelerated action toward zero emissions.
- TMG aims to realize a decarbonized city that acts as a model for the world by strategically making every effort.
- In March 2025, the 2050 Tokyo Strategy was formulated as a new guiding principle for TMG. We consider the Zero Emission Tokyo Strategy Beyond Carbon Half as an initiative based on the 2050 Tokyo Strategy to promote the policies.

Tokyo 2050 Strategy

Unlocking a Better Future

Strategy 20 Zero Emissions

Vision for the 2050s

Realizing a decarbonized society to greatly contribute to achieving net zero worldwide

Direction of Policies toward 2035

- Realizing decarbonization and stable energy supply by accelerating the deployment of renewable energy and enhancement of energy efficiency
- Accelerating the social implementation of Green Hydrogen as a key solution for decarbonization
- Promoting adaptation measures in all fields to minimize climate change impacts

10 Policies and 8 Priority Projects for Effective Initiatives

Policy 1	Making Renewable Energy a Major Energy Source
Policy 2	Expanding Zero Emission Buildings
Policy 3	Promoting Zero Emission Mobility
Policy 4	Expanding the Use of Hydrogen Energy
Policy 5	Shift to a Circular Economy (Promotion of the Sustainable Use of Resources, Measures for Plastics, and Measures for Food Waste)
Policy 6	Measures for Fluorocarbons
Policy 7	Promoting Climate Change Adaptation Measures
Policy 8	TMG's Initiatives for Its Own Sustainability
Policy 9	Collaborating with All Entities
Policy 10	Building the Foundation for Realizing a Zero Emission Tokyo (Finance etc.)

Priority 1	Expanding the Use of Next-Generation Solar Cells
Priority 2	Introducing Floating Offshore Wind Turbines
Priority 3	Doubling Thermal Insulation of Existing Houses
Priority 4	Building a ZEV Charging Infrastructure That Allows Charging at Any Time in a Nearby Location
Priority 5	Working with Other Prefectures to Expand the Green Hydrogen Network
Priority 6	Promoting Sustainable Resource Management by Recycling Solar Panels
Priority 7	Preparing for a Hotter Future - Aiming to Be a City Resilient to the Heat
Priority 8	Developing the Next Generation of Leaders to Drive a Decarbonized Future



03

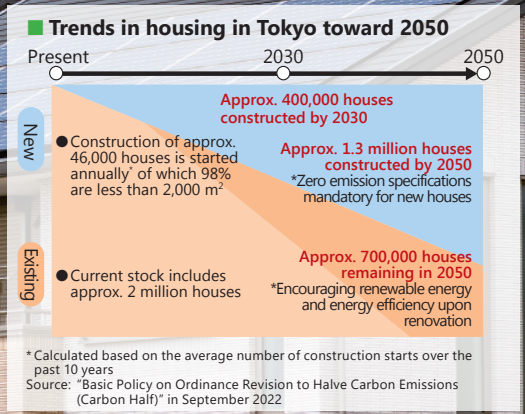
CHAPTER 03

DEVELOPING EFFECTIVE INITIATIVES

Leveraging the mandatory introduction of solar power generation equipment, Tokyo will expand the network of zero emission buildings

In April 2025, Japan's first program for solar power generation, thermal insulation performance, and energy efficiency performance will be launched covering new detached houses and other buildings.

By 2050, it is expected that **approximately half** of the building stock (approx. 70% for houses) **will be replaced** by new buildings. Approximately 70% of Tokyo's CO_2 emissions come from buildings. Recognizing that measures for **new buildings that will shape the city of 2050** are **extremely important for realizing a Zero Emission Tokyo**, TMG has established **a new program, the Environmental Building Reporting Program**.



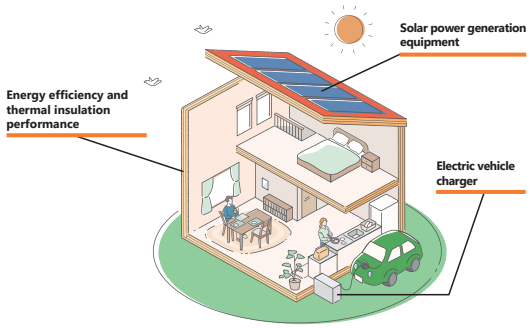
Entities responsible for installing solar power generation equipment

- Major house builders and other businesses* that supply a total floor area of 20,000 m² or more annually in Tokyo
- New buildings with a total floor area of less than 2,000 m² subject to the program

* Businesses that have made application and been approved by the governor will also be able to participate in the program.

Obligations

① Installation of solar power generation equipment
② Ensuring thermal insulation and energy efficiency performance
③ A mechanism to mandate or encourage the installation of electric vehicle chargers and other equipment



A home with high environmental performance enhances quality of life by creating positive synergy effects

Reductions in electricity bills

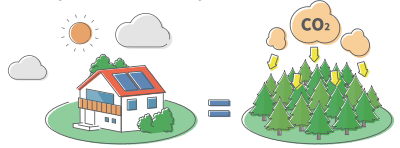
If a 4-kW solar power system is installed at a new detached house,

Approx. 92,400 yen can be saved per year.

Estimate based on a household of two or more people living in a ward as of August 2024

Contribution to CO_2 emission reductions

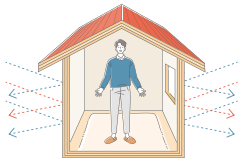
The amount of CO_2 reduced by a 4-kW solar power system for a year is equivalent to the removal effected by approximately 200 cedar trees.



Healthy living

A comfortable room temperature maintained through thermal insulation leads to a healthy living.

- Reducing heat shock
- Alleviating allergies
- Preventing condensation and mold



Preparation for power outages

Electricity is available during power outages. A storage battery allows electricity use at night.

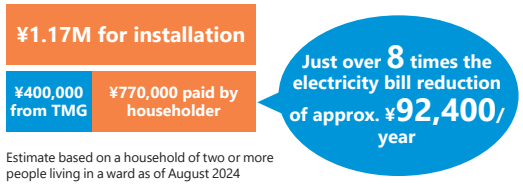


Comprehensive support measures by TMG

❶Subsidies for the installation of solar power generation equipment

100,000 yen/kW for new houses in principle

If 4-kW equipment is installed at a new detached house:



Estimate based on a household of two or more people living in a ward as of August 2024

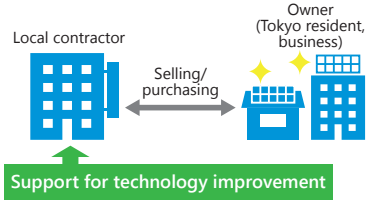
❷Setup costs eliminated with leasing etc.

Subsidize installation services without setup costs to promote installations



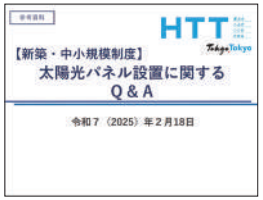
❸Supporting the development of manufacturers' systems

Support local contractors and other entities in improving technology to increase the number of suppliers of houses with high environmental performance



❹Help desk

TMG answers your inquiries about support and installation.



Scan the QR code for more information:

Progress in the development of houses with high environmental performance

- With the program in place, housing suppliers are striving to increase the supply of buildings with high environmental performance that are standardly equipped with solar power generation equipment.
- There is an expansion in product development according to the nature of custom-made, built-for-sale, and rental housing as well as in installation services without setup costs, resulting in different forms of installation.



Tokyo Sekisui Heim Co., Ltd.
Enlarging the roof to increase PV capacity



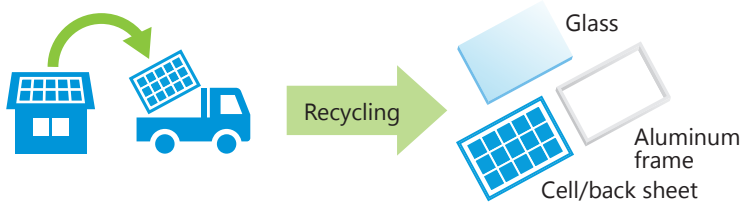
Panasonic Homes Co., Ltd.
Promoting ZEH for rental housing

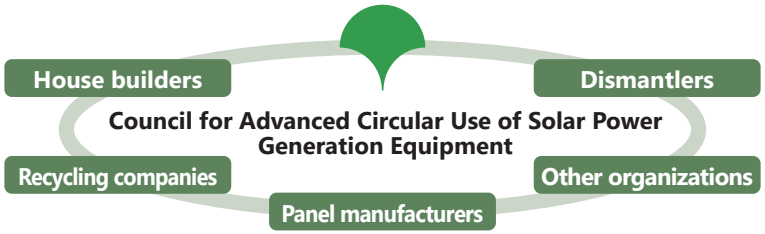


Tact Home Co., Ltd.
No setup costs for built-for-sale detached houses

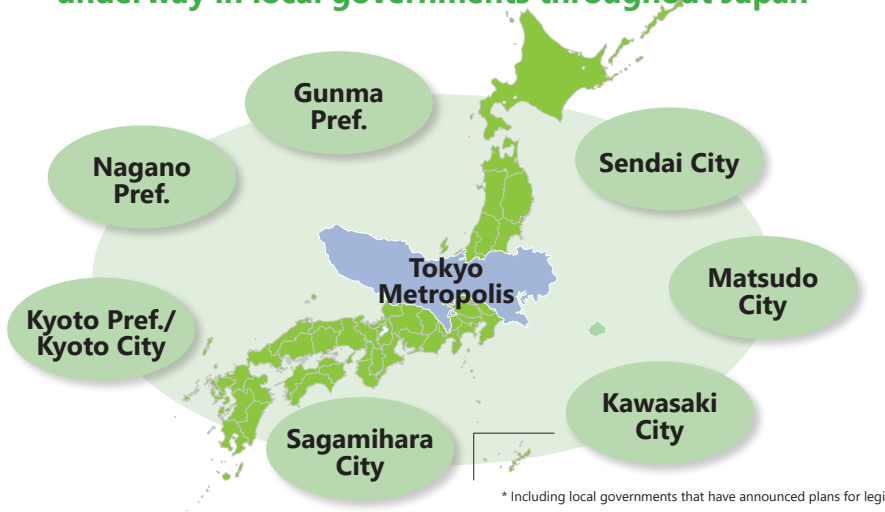
Promoting the sustainable resource management of solar power generation equipment in anticipation of disposal in the future

- Strengthen the foundation for recycling residential solar panels in preparation for mass disposal in the future
- Recycle the solar panels at facilities in and around Tokyo in cooperation with business and industry organizations





Initiatives for the mandatory installation of solar panels underway in local governments throughout Japan



* Including local governments that have announced plans for legislation

Policy 1 Making Renewable Energy a Major Energy Source

Necessity of making renewable energy a major energy source

- Decarbonization of supplied electricity is important as approximately 70% of CO_2 emissions in Tokyo come from electricity.
- Local production and consumption of renewable electricity helps secure essential lifeline services during power outages, which are becoming more frequent due to natural disasters.
- To support the growth of cities, it is critical to make renewable energy, which also contributes to energy security and higher industrial competitiveness, a major energy source.

Current status of making renewable energy a major energy source

As a major consumer of energy, we have started to encourage the local production and consumption of renewable electricity and its widespread use

- TMG has strengthened its efforts to further accelerate the introduction of renewable energy on the demand side, as shown by establishing a new program (to be implemented in April 2025) that requires the installation of solar power generation equipment on new buildings as well as launching bold support measures.
- We have also enhanced our efforts on the supply side, as evidenced by requiring general electricity utilities supplying electricity to Tokyo to set FY 2030 target ratios of renewable electricity as well as indicating a level for the target to be around 50%.

Trends in renewable energy

New technologies that are expected to be massively introduced in the future, such as next-generation solar cells and floating offshore wind turbines have emerged

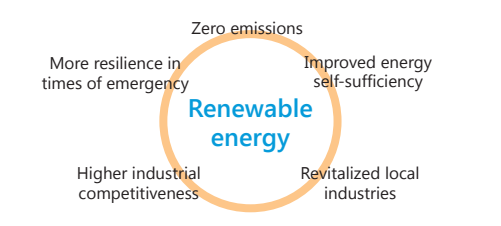
The effective use of surplus renewable electricity has become increasingly important

- Output is sometimes curtailed as surplus electricity is generated during the day due to an increase in solar power generation in Japan.
- As a step to effectively use renewable electricity, it is necessary to adjust supply and demand through the introduction of residential and grid storage batteries.

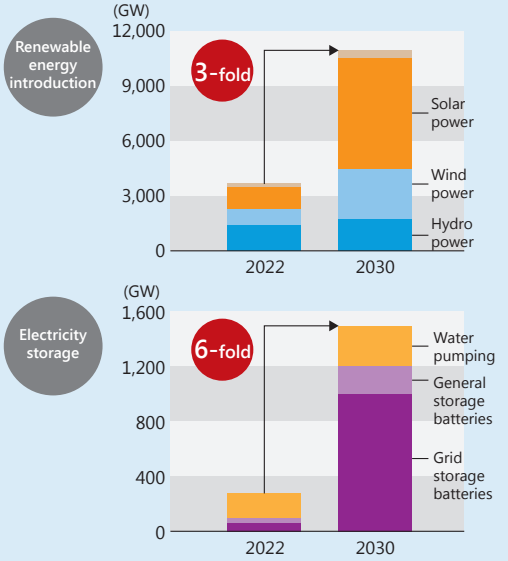
Rapidly growing momentum for expanding renewable energy

- The push to expand renewable energy is gaining momentum both in Japan and globally, following international agreement on tripling renewable energy capacity and increasing energy storage sixfold by 2030. In Japan, a growing number of companies and organizations are now operating exclusively on renewable energy.

Renewable energy is essential for the growth of cities



Worldwide requirements by 2030 according to IEA



Results in fiscal year, targets in year

	2022 results	2030 targets	2035 targets	2050 visions
Percentage of power generated by renewable energy	22%	Approx. 50%	60% or more	
Installation of solar power generation equipment	720 MW	2.0 GW or more	3.5 GW	
Installation of next-generation solar cells (part of above)	—	—	Approx. 1 GW*	
Installation of offshore wind turbines	—	—	1 GW or more	
Installation of residential storage batteries	420 MWh	2.5 GWh	3.5 GWh	
Installation of grid storage batteries (in TEPCO's service area)	—	260 MW	400 MW	

▶All energy to be decarbonized

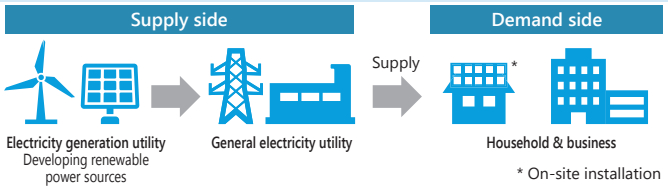
- A "power-generating future city" where electricity can be generated in every area, will be our reality, supplying fully decarbonized electricity using renewable energy as a major power source

* 2040 target is approx. 2 GW

Direction for Intensified Action

- Accelerate the **introduction and use of various renewable energies on the demand and supply sides** by making the most of Tokyo's **potential**, such as concentrated buildings in central parts of the city and the vast seas surrounding the islands, taking into account technological advances
- As a **foundation** for further expanding the introduction of renewable electricity, TMG will create an environment in which electricity demand in Tokyo can serve as **balancing energy for renewable power sources** - for example, by introducing storage batteries and promoting demand response

Accelerating the introduction and use of renewable energy from both the supply and demand sides



Major Efforts

PJ : Priority project

Strengthening response to the demand side and standardizing the introduction and use of renewable energy

Standardizing the installation of solar power generation equipment at buildings through TMG ordinances

- Promote zero emission buildings through Japan's first program mandating the installation of solar power generation equipment on new houses and buildings, alongside the Tokyo Green Building Program

Further promoting local production and consumption of electricity by expanding renewable electricity generated in Tokyo

- Expand the use of renewable electricity by encouraging services without setup costs and group buying in addition to subsidizing the installation of solar power generation equipment and storage batteries at houses and facilities
- Address issues specific to Tokyo, such as limited roof space and densely built environments, by promoting the adoption of advanced solar power generation systems featuring compact sizes, lightweight designs, and integration with building materials
- Promote the introduction of self-consumption renewable energy equipment by increasing subsidies for agrivoltaics leading to local revitalization and biomass power generation using waste materials

Creating an environment to expand the use of renewable electricity by consumers

- Increase the supply of renewable electricity in Tokyo by promoting the use of renewable electricity in buildings through the Tokyo Cap-and-Trade Program and other systems
- Strengthen efforts to install large renewable energy equipment outside Tokyo and allow data centers and other facilities in Tokyo to use its electricity in order to address their increased electricity demand

Decisively encouraging the development of next-generation renewable energy technologies

- Contribute to establishing construction methods and building mass production systems for next-generation solar cells by supporting their development, introducing them at TMG facilities ahead of others, and providing intensive support for private businesses PJ
- Promote the social implementation of next-generation renewable energy technologies, including cylindrical solar cells and solar pavements, through collaboration with universities and support for developers

Increasing renewable energy supply by promoting power source development

Encouraging renewable electricity supply by general electricity utilities

- Enhance the Energy Environment Program to increase general electricity utilities with a higher ratio of renewable electricity
- Support the development of renewable power sources by general electricity utilities and strengthen renewable energy supply capacity, addressing large electricity demand at data centers and other facilities

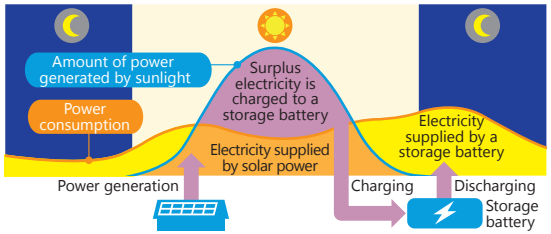
Introducing offshore wind turbines that harness the potential of the islands

- Aim to introduce a gigawatt-class farm of floating offshore wind turbines in the waters around the Izu Islands PJ
- Expand the use of renewable energy on the islands, providing support for projects aimed at introducing geothermal power generation on Hachijojima Island and floating offshore wind turbines around Oshima Island
- Promote the development of a 100% renewable electricity supply system for the islands by demonstrating the use of solar panels on Hahajima Island

Ensuring balancing energy for renewable power sources to support the expansion of renewable energy

- Utilize electricity demand in Tokyo as balancing energy for renewable energy to support the expansion of renewable electricity by promoting demand response and the introduction of storage batteries in homes and facilities
- Ensure balancing energy to address output fluctuations of renewable energy by providing support to businesses introducing power storage systems directly connected to power grids

Using storage batteries to provide balancing energy for the amount of power generated by sunlight



Source: Special content of the Agency for Natural Resources and Energy

Priority Project

Expanding the Use of Next-Generation Solar Cells

■ In order to achieve TMG's new policy goal of **installing 3.5 GW of solar power generation equipment in Tokyo by 2035**, it is necessary to develop and deploy **next-generation solar cells*** that will enable the **additional installation** of solar power generation equipment.

■ TMG will **formulate a roadmap** to show the **installation targets and direction of efforts for next-generation solar cells**, an innovative technology **born in Japan**, and be committed to realizing a **"power-generating future city"** by strategically promoting them **in cooperation with the national government and private businesses**.

* Solar cells that use a crystal structure called perovskite

Why should Tokyo use next-generation solar cells? – Significance of their introduction

- It is the responsibility of Tokyo as a major energy consumer to introduce renewable energy equipment and expand the use of renewable electricity in the city.
- Tokyo, the capital of Japan, is home to a diverse array of buildings, including office buildings and houses, and transportation infrastructure.
- The lightweight and flexible next-generation solar cells can be installed on roofs with low load-bearing capacities as well as building exteriors and windows where existing solar power generation equipment is difficult to install, making it possible to maximize the power generation potential of many buildings in Tokyo.

By increasing their installations and creating demand for them, TMG aims to make a significant contribution to the widespread use of next-generation solar cells, a technology developed in Japan.

Features of next-generation solar cells

❶ Lightness and flexibility
Bending resistance, possibility of weight reduction

❷ Power generation in low light
Power generated in the mornings and evenings, on cloudy or rainy days, and even with indoor lighting

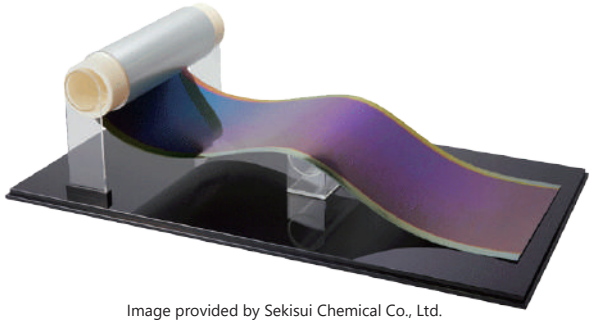
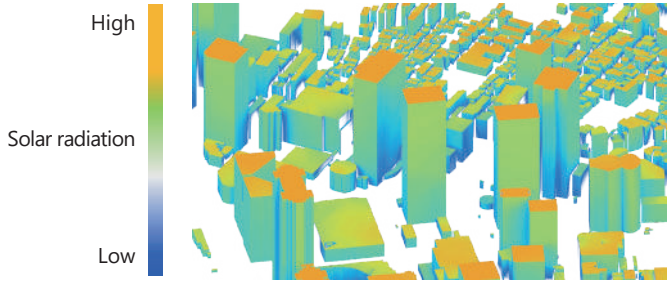


Image provided by Sekisui Chemical Co., Ltd.

❸ Lower cost
Fewer manufacturing processes, possibility of cost reduction in the future through mass production

❹ Stable supply of raw materials
Japan's production of iodine, the main raw material, accounts for approximately 30% of the world's production

■ **Power generation potential in central Tokyo**



* Solar radiation on buildings in part of Shinjuku Ward

■ **Number of facilities in Tokyo**

Number of private facilities	628,239 (12.2% of Japan's total)
Number of retail facilities	87,895 (10.0% of Japan's total)
Number of manufacturing facilities	38,766 (9.4% of Japan's total)

Source: "Industry and Employment in Tokyo in 2024"

■ To take the lead in creating demand for the cells and promote the establishment of their production system, TMG will **set installation targets in Tokyo (Ex: Approx. 1 GW for 2035)**.
■ To achieve these targets, TMG will **introduce the cells in TMG facilities ahead of others** and **provide support for private businesses that introduce the cells**.
■ TMG will continue support for cell developers, **encourage the early commercialization** of the cells, and **promote public relations for their widespread adoption**.

Setting installation targets

Installation in Tokyo

◆ 2035 target: Approximately 1 GW

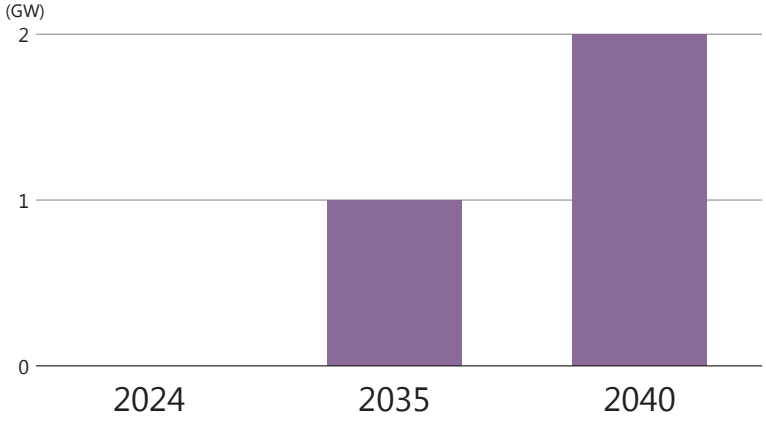
Including approximately 10 MW installed in TMG facilities

* Including solar power generation equipment installed on exteriors other than next-generation solar cells

◆ 2040 target: Approximately 2 GW

Approx. 10% of the national government's installation target

Reference: The national government's installation target is approximately 20 GW.



Set these targets to ensure investment predictability and encourage businesses to build production systems

Current efforts to achieve the installation targets

Initial introduction at TMG facilities

- Increase installations and disseminate information to encourage efforts made by various entities

Subsidizing introduction by private businesses

- Subsidize all of the installation costs (equipment and construction costs only) of next-generation solar cells

Increase installations to establish construction methods
Contribute to establishing mass production systems through aggressive introduction and demand creation

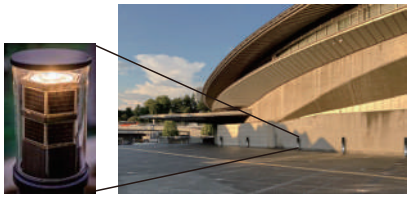
Development support

- Provide part of TMG facilities as demonstration sites and subsidize expenses incurred by developers

Example of demonstration site:
Tokyo International Cruise Terminal



Subsidies for a developer (project adopted in FY 2024):
Garden lights with next-generation solar cells



Encourage product development to promote early commercialization

Promoting public relations for widespread adoption

- Promote public relations in collaboration with developers and businesses eligible for subsidies for introduction

Priority Project

Expanding the Use of Next-Generation Solar Cells

■ To accelerate the adoption of next-generation solar cells, TMG will proactively support each phase in collaboration with the national government, local governments, and the private sector.

- **Deployment phase**: TMG will help **establish construction methods and build mass production systems by increasing installations and creating initial demand**. It will also **promote broader adoption by supporting development and encouraging installation across a variety of site types**, taking advantage of their characteristics.
- **Phase of widespread use**: **TMG will foster the autonomous large-scale uptake of next-generation solar cells by driving a cycle of wider adoption and cost reduction**.

Deployment phase

- Increase installations and create initial demand through early introduction by the public sector and advanced businesses
- Provide development support and promote public relations to increase awareness
- Encourage the establishment of construction methods and the building of mass production systems

Phase of widespread use

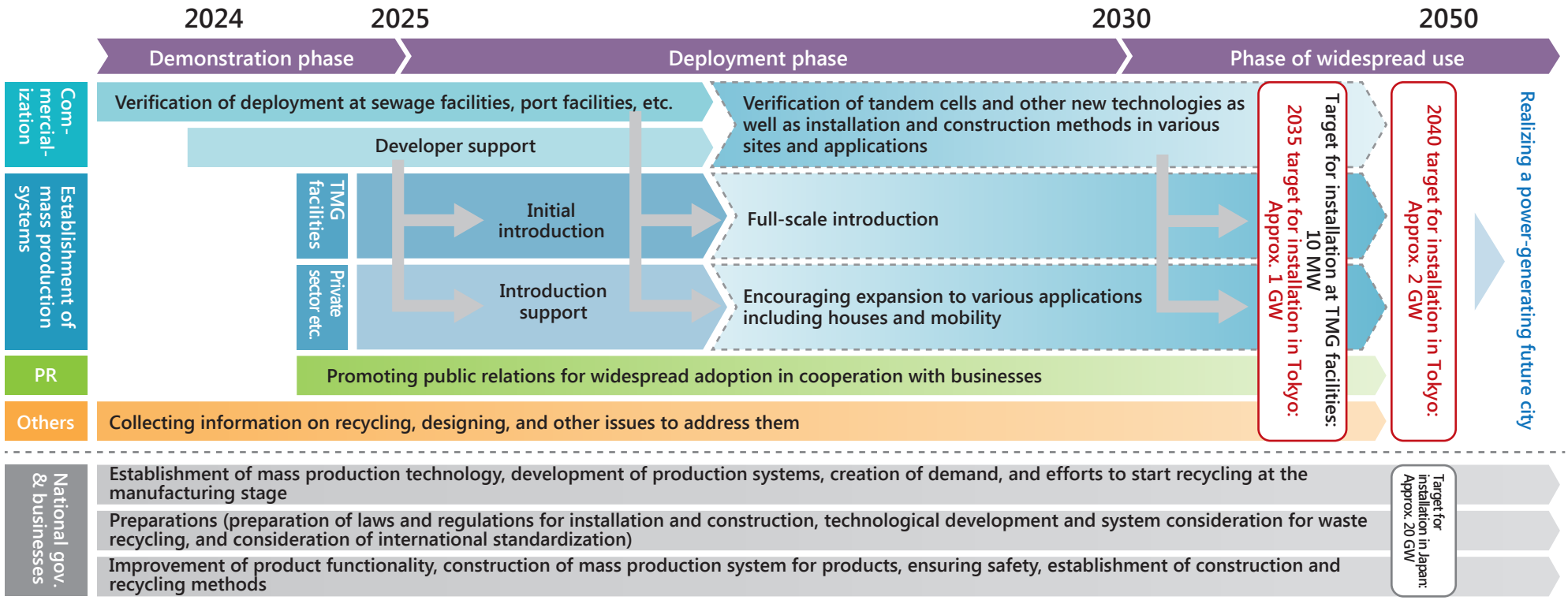
- Expand applications by diversifying installation sites and encouraging the development of tandem cells
- Promote appropriate disposal and recycling methods

- Realize autonomous widespread adoption by promoting cost reduction through mass production

■ **Examples of possible installation sites**



- From demonstration to early deployment: Contribute to **establishing construction methods and building mass production systems** by providing support for businesses and creating initial demand
- Intermediate deployment: Promote **full-scale introduction at TMG facilities** and encourage the **expansion of uses to houses and mobility** at the mass production stage
- Phase of widespread use: **Realize autonomous widespread adoption and achieve installation targets** by promoting a cycle of widespread use and cost reduction



For more information

Roadmap for expanding the use of next-generation solar cells formulated in March 2025

- Sets installation targets to encourage businesses to build production systems
- Summarizes the direction of efforts to achieve the targets

Priority Project

Introducing Floating Offshore Wind Turbines



- Aim to **introduce a gigawatt-class farm of floating offshore wind turbines** in the waters around the Izu Islands
- Make the most of the potential of the waters around the Izu Islands to contribute to the realization of **zero emissions on the islands**

Trends in offshore wind turbines

- In order to realize a 2050 Zero Emission Tokyo, it is necessary to expand the introduction of offshore wind turbines which are crucial for making renewable energy the primary power source.
- As the installed capacity of offshore wind turbines is increasing worldwide, Japan has also set a target of installing 5.7 GW by 2030, promoting project formation under the Renewable Energy Sea Area Utilization Act.
- Bottom-mounted turbines for coastal waters less than 50 m deep have been the mainstream, but technological advances have made floating turbines suitable for deeper waters a reality—The potential of floating turbines is more than twice that of bottom-mounted turbines on a global basis.
- A turbine consists of more than 30,000 different parts, which are comparable to those in an automobile. A wide range of economic spillover effects are expected, such as strengthened port infrastructure, improvements in its maintenance and management, tourism around ports, and the creation of new industries and jobs, in addition to those for turbines themselves.
- The national government aims to increase the domestic procurement ratio with respect to the total cost of materials, construction, operation, and maintenance related to offshore wind turbines to at least 60% by 2040.

Requirements for introducing turbines in the Izu Islands waters

- To introduce offshore wind turbines, it is necessary to coexist with existing users of the waters, including parties engaged in fishing, tourism, and ship navigation in addition to giving consideration to the natural environment, ecosystems, and landscape.
- TMG is committed to gaining the understanding and cooperation of local residents by showing the benefits of wind power generation, such as improvements in disaster preparedness.

Efforts for FY 2025:

◎ Surveys of fishing operation and the habitat conditions of birds, marine mammals, and other living things

◎ Initiatives to promote the understanding of local residents

■ Coexistence with fishing industry through the formation of fish reefs



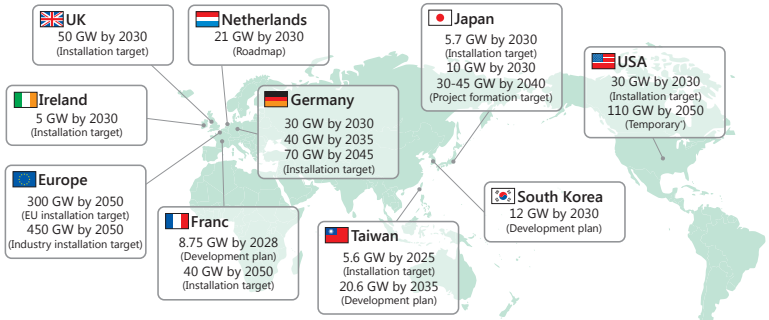
Source: Goto City Hall website

Project formation by gaining the understanding and cooperation of local people

Introducing a gigawatt-class farm* of floating offshore wind turbines

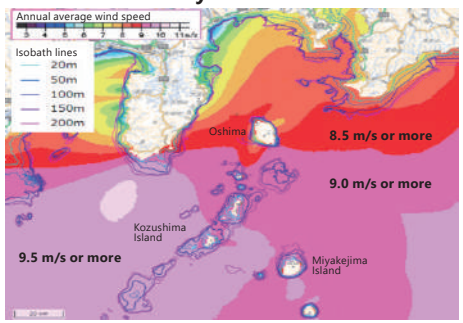
* Can cover the annual power consumption of 900,000 average households

■ **Installation targets at home and abroad**

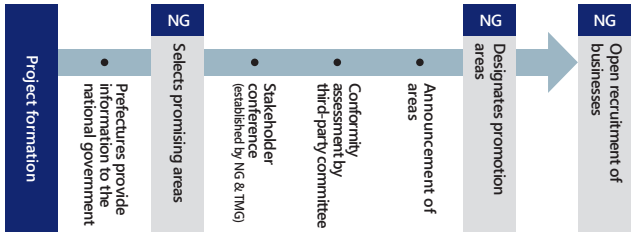


Source: "Offshore Wind Power Generation Skills Guide," Japan Wind Power Association

■ **The Izu Islands waters in good wind conditions**
Wind speeds in some areas are at least 7 m/s, a guideline for business feasibility



■ **Procedures under the Renewable Energy Sea Area Utilization Act**



Topic

"Multiplicative" Efforts Have Synergistic Effects! Community Symbiotic Renewable Energy

The use of renewable energy has the potential to solve various community issues related to agriculture, disaster preparedness, industry, and tourism.
Focusing on the perspective of policy collaboration, TMG will promote the introduction of community symbiotic renewable energy with high synergistic effects.

Solar power generation



Offshore wind power generation



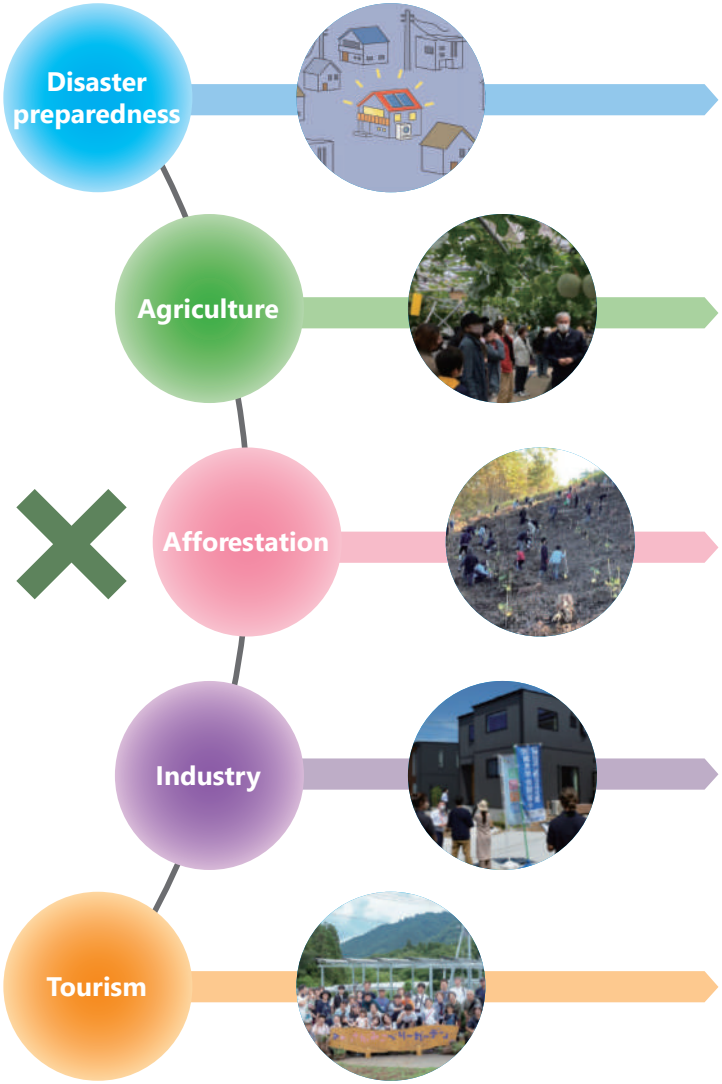
Woody biomass



Hydropower generation



Source: Websites of the Ministry of Agriculture, Forestry and Fisheries, and the Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry



Disaster preparedness

Renewable energy contributes to securing power sources in the event of a disaster. It makes evacuation at home an option

TMG will

Introduce solar power generation equipment and storage batteries to houses etc.



Agriculture

Agriculture combined with power generation helps stabilize business. The shade of solar panels provides heat countermeasures

TMG will

Subsidize the introduction of renewable energy for local production and consumption



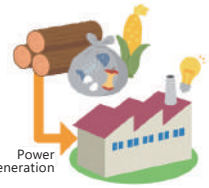
Afforestation

Renewable energy allows the effective use of forest resources and local circulation including afforestation activities

TMG will

Promote the use of woody biomass

Project to promote the introduction of renewable energy/energy storage equipment for local production and consumption



Industry

Renewable energy is related to various industries, from construction to management, acting as the key to economic growth

TMG will

Encourage the growth of the renewable energy industry



Tourism

Renewable energy power plants are also a tourism resource that attracts people

TMG will

Promote renewable energy and organize inspection tours



Policy 2 Expanding Zero Emission Buildings

Necessity of expanding zero emission buildings

- Approximately 70% of Tokyo's CO_2 emissions come from buildings. As buildings are used for decades, their nature will determine whether or not a 2050 Zero Emission Tokyo can be realized. It is necessary to standardize energy efficiency, the use of renewable energy, and the utilization of low-carbon materials in all new and existing buildings.
- Zero emission buildings will ensure healthy and comfortable living spaces, strengthen resilience, and support the realization of a robust and sustainable city.

Current status of expanding zero emission buildings

- Along with support measures in place, TMG is promoting a shift to zero emission buildings in collaboration with Tokyo residents by establishing and enhancing programs that mandate the ensuring of thermal insulation and energy efficiency performance and the introduction of renewable energy for new and existing buildings.
- For energy consumption in Tokyo, the residential sector alone shows an increase due to an increasing number of households and for other reasons, indicating the need for further measures for the sector.
- The industrial and commercial sectors have continued emission reductions under the gradual strengthening of the Tokyo Cap-and-Trade Program and the Carbon Reduction Reporting Program for Small and Medium-Sized Facilities, but further reductions are needed.
- The introduction of highly energy-efficient equipment is still at an early stage, requiring more capital investment.

Trends in zero emission buildings

In April 2025, all new houses and buildings in Japan will be required to comply with energy efficiency standards

- The national government has also started to strengthen measures, requiring all new buildings to comply with energy efficiency standards and legislating the labeling of energy efficiency performance that also covers existing buildings.

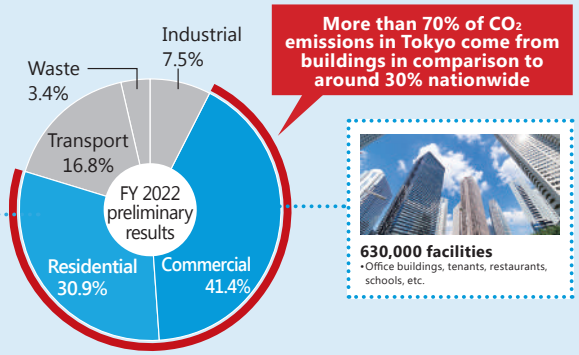
Decarbonization management underway at companies

- An increasing number of companies are placing importance on decarbonization management, driving a growing movement to demand greater transparency regarding climate change initiatives. Investors and financial institutions are increasingly viewing the environmental performance of buildings, particularly their use of renewable energy, as essential criteria for investment decisions.

Sector breakdown of CO_2 emissions

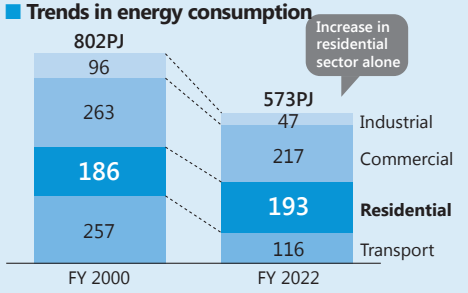


14 million people living in 2 million residential buildings*
*Consisting of approximately 7.2 million homes

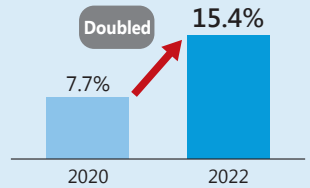


630,000 facilities
- Office buildings, tenants, restaurants, schools, etc.

Trends in energy consumption



Percentage of SMEs reporting client-driven requests for carbon neutrality compliance



Source: "2023 White Paper on Small and Medium Enterprises in Japan," Small and Medium Enterprise Agency

	2022 results	2030 targets	2035 targets
Greenhouse gas emissions compared to 2000	4.4% reduction	50% reduction	At least 60% reduction
Energy consumption compared to 2000	28.6% reduction	50% reduction	At least 50% reduction
Number of high efficiency water heaters installed	Approx. 2.5 million	Approx. 3.6 million	Approx. 4.54 million
Households with thermal insulation retrofits	Approx. 1.7 million	3.55 million	3.85 million
SMEs with energy efficient equipment	—	5,000	10,000

2050 visions

▶ All buildings in Tokyo will be zero emission buildings

- All buildings will have become zero emission buildings that account for adaptation measures (resilience), such as disaster prevention and heat countermeasures

Accelerating the decarbonization of new buildings and the vast stock of existing buildings **by strengthening institutional and support measures**

Strengthening the programs to accelerate the decarbonization of buildings

Residential | Commercial/industrial

New Buildings [Effective from April 2025]

Large

Strengthened Green Building Program for New Buildings — Floor area 2,000 m² or more

- Renewable: **Mandatory consideration** of the introduction/use of renewable energy
- Efficiency: **Mandatory conformance** to the standards for thermal insulation and energy efficiency performance (excluding residential buildings)

→ **Mandatory installation of renewable energy equipment, including solar power generation equipment, and a ZEV charger**

→ **Strengthening the standards for thermal insulation and energy efficiency performance etc.**

New Environmental Building Reporting Program — Floor area less than 2,000 m²

- Renewable: **Mandatory installation of solar power generation equipment and a ZEV charger**
- Efficiency: **Mandatory installation of thermal insulation and energy efficient equipment etc.**



Small/medium

Local (Urban development/energy management)

Strengthened Local Decarbonization Planning Program [Effective from April 2024]

TMG formulates guidelines, and developers formulate and publicly disclose decarbonization policies etc.

Commercial/industrial Existing Buildings [Effective from April 2025]

Strengthened Tokyo Cap-and-Trade Program

- Renewable: Emission reductions through low-carbon electricity
- Efficiency: CO_2 emission **reduction obligations**

→ **Enhancing mechanisms to promote the expanded use of renewable energy**

→ **Incentive measures to encourage active efforts etc.**

Strengthened Carbon Reduction Reporting Program for Small and Medium-Sized Facilities

- Renewable: **Reporting** on the use of renewable energy
- Efficiency: **Reporting** on CO_2 emissions and energy efficiency measures

→ **Reporting on setting 2030 targets and status of achievement**

→ **Expanding mechanisms to encourage active efforts etc.**



Major support measures promoted along with the programs



Residential

- Subsidizing the construction of new houses with high energy efficiency performance and Tokyo Zero Emission Houses
- Subsidizing thermal insulation, the installation of solar power generation equipment, and its recycling for existing houses
- Intensive subsidization of thermal insulation and renewable energy introduction for rental housing
- Subsidizing services to install solar power generation equipment and storage batteries with no setup costs
- Subsidizing switching to energy efficient home appliances through Zero Emission Points

Commercial/industrial

- Subsidizing the introduction of renewable power generators and storage batteries for local production and consumption
- Subsidizing the transformation of small and medium-sized facilities into zero emission buildings
- Subsidizing energy efficiency improvements through integrated design with an eye to the future beyond 2030
- Subsidizing the procurement of renewable power sources outside Tokyo (Outside Tokyo PPA)
- Subsidizing the introduction of heating equipment by local energy suppliers

Direction for Intensified Action

Residential Sector

- Promote the **standardization for constructing zero emission houses** by **creating a cycle** of supplying houses with high environmental performance and stimulating demand for them with a **focus on the new program**
- Accelerate **thermal insulation upgrades and the adoption of renewable energy in existing homes** by leveraging **cross-sectoral mechanisms**—such as health, disaster preparedness, and others—and providing **intensive, hands-on support** tailored to diverse needs
- Promote individual **environmental actions** that contribute to sustainable and fulfilling lifestyles by **providing supportive services and fostering momentum** through **public-private partnerships**

Major Efforts

Making new houses zero emission through programs and support measures

- Promote zero emission buildings by mandating the ensuring of energy efficiency and thermal insulation performance
- Increase the number of businesses constructing houses with high environmental performance by supporting technical advancements of local contractors and product development by small and medium-sized house builders not currently subject to regulatory requirements
- Acknowledge and highlight leading businesses that actively promote buildings with superior environmental performance
- Promote the understanding of the environmental performance of houses through public relations tailored to specific targets, such as people considering purchasing homes or relocation
- Expand the adoption of Tokyo Zero Emission Houses by subsidizing the construction of these houses that surpass the national thermal insulation and energy efficiency standards

Tokyo Eco Builders Award 2025



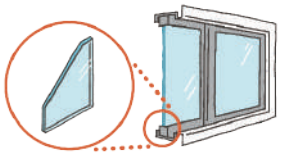
Promoting energy efficiency and renewable energy at existing housing

- Encourage improvements in thermal insulation and the introduction of energy efficient and renewable energy equipment through a variety of subsidy options

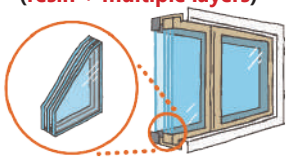
Aiming to increase the number of thermal insulation retrofits in rental housing to 1 million

- Promote thermal insulation retrofits and the introduction of renewable energy in rental housing through energy efficiency performance diagnosis, hands-on support through concierge services, and performance indication in housing advertisements PJ
- Encourage the use of renewable energy throughout buildings by subsidizing the introduction of integrated low-voltage power receiving systems in conjunction with solar power generation equipment

Window before retrofit
(aluminum + single layer)



Window after retrofit
(resin + multiple layers)



Enhancing the comfort, earthquake resistance, and security performance of built-for-sale detached houses

- Decisively promote energy efficiency action by developing an energy efficiency diagnostic campaign along with earthquake resistance projects PJ
- Encourage thermal insulation retrofits alongside security measures by expanding subsidies for insulated security windows PJ
- Encourage the use of renewable electricity throughout a building by subsidizing 100% renewable electricity supplied via integrated high-voltage power receiving systems
- Through the platform set up by TMG and housing-related organizations, TMG will promote energy efficient and renewable energy houses by supporting and sharing information with these organizations

Platform for promoting energy efficient/ renewable energy houses



Implementing advanced energy management and accelerating momentum and changes in consumer behavior

- Encourage energy management by subsidizing the construction of an aggregation business system that optimizes energy demand using storage batteries, water heaters, and other equipment
- Foster momentum at home and other places by disseminating key messages of the HTT*1 and Deco-Katsu*2 initiatives through PR videos and events in collaboration with the national government and companies
- Accelerate changes in consumer behavior by subsidizing switching to energy efficient home appliances through Tokyo Zero Emission Points and supporting energy efficiency and renewable energy initiatives in cooperation with energy retailers and households

*1 Means TMG's HTT (Herasu (Save), Tsukuru (Generate), and Tameru (Store) Electricity) Initiatives
*2 Nickname for the National Movement for New and Prosperous Lifestyles toward Decarbonization

HTT 電力を へらす つくる ためる Tokyo Tokyo

デコ活 くらしの中のエコろがけ



Direction for Intensified Action

Industrial/Commercial Sectors

- Encourage **energy efficiency and the use of renewable energy starting from the planning stage of large new buildings and CO_2 emission reductions during their construction** through programs and integrated design methods
- Encourage **zero emissions for existing facilities** by promoting advanced major renovations and subsidizing research, design, and renovations at small and medium-sized facilities
- **Accelerate broad-based and integrated decarbonization** through decarbonized urban development and advanced energy management including energy interchange between buildings

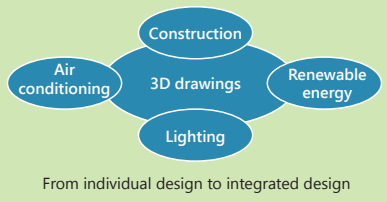
Major Efforts

Encouraging zero emissions in large new buildings

- Promote zero emissions at the construction stage based on the mandatory energy efficiency and renewable energy introduction, the use of low-carbon materials, and CO_2 reduction during construction
- Promote an approach that uses three-dimensional design models (BIM*) in early stages of design for an integrated energy efficient design

* Building Information Modeling creates a building information model that contains both three-dimensional shape data generated by computer and the building's attribute information

BIM-based designing



From individual design to integrated design

Promoting integrated decarbonization through urban development

- Promote urban development in which developers take the lead in decarbonization under the Urban Redevelopment Systems and Local Decarbonization Planning Program
- Subsidize broad-based decarbonization by municipalities and encourage entities' efforts and consensus among them in order to create zero emission districts specific to TMG
- To achieve the carbon neutrality of the Port of Tokyo and Tokyo Waterfront City, TMG will promote energy efficiency and renewable energy at port facilities and warehouses as well as the construction of zero emission buildings in collaboration with private businesses
- Reduce carbon emissions from public works by using low-carbon asphalt mixture for paving and other purposes

Promoting energy efficiency and renewable energy in existing buildings

Realizing steady CO_2 reduction and advanced initiatives for large facilities

- Promote further energy efficiency and the expanded use of renewable energy through the Tokyo Cap-and-Trade Program
- Encourage further energy efficiency beyond 2030 by subsidizing research aimed at realizing integrated design that optimizes energy efficiency
- Encourage the realization of technologies for improving energy efficiency by building a pioneering initiative model that will contribute to higher energy efficiency at data centers for sharing know-how

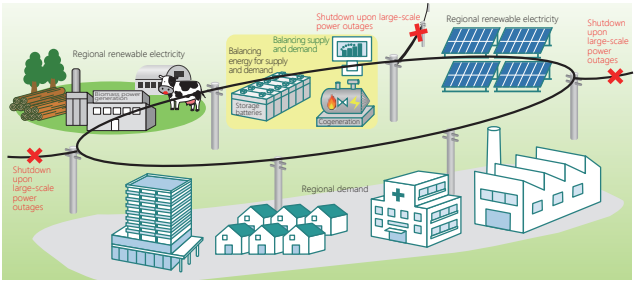
Promoting further decarbonization actions and energy efficiency at small and medium-sized facilities

- Encourage decarbonization actions by recognizing businesses working to meet the energy efficiency and renewable energy levels for 2030 and certifying excellent businesses
- Make small and medium-sized facilities zero emissions by providing support for research and design as well as the installation, renovation, and operational improvement of equipment
- Promote the use of waste heat from factories and unused renewable heat by subsidizing the introduction of heat exchangers and heat pumps

Realizing advanced energy management

- Promote the optimization of supply and demand through broad-based interchange by subsidizing the introduction of cogeneration systems that simultaneously generate electricity and heat as well as heat and electricity interchange infrastructure including heat ducts
- Promote the introduction of aggregation businesses that balance the supply and demand of electricity
- Subsidize the modeling of a microgrid that enables the broad-based interchange of renewable electricity within a region

Schematic representation of a regional independent microgrid



Source: "Accelerating the Introduction of Distributed Resources," Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry

Topic

Improving the Environmental Performance of Existing Houses to Promote a Family-Friendly, Sustainable Lifestyle

Supporting energy-efficient and comfortable living at existing homes

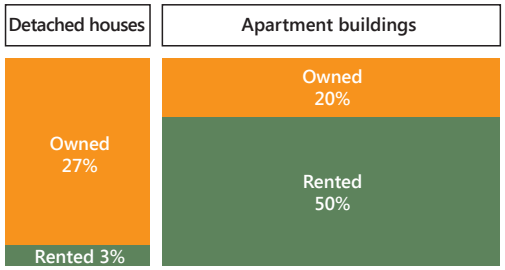
- Support is needed for not only the Tokyo residents living in new houses but also those in the approximately 7.2 million existing houses.
- Taking into account the characteristics of the residential sector in Tokyo, TMG will further promote houses with high environmental performance by emphasizing the energy efficiency of houses, a key factor influencing their value.

Characteristics of the residential sector in Tokyo include:

✓ It accounts for approximately 30% of energy consumption and is the only sector that has shown an increase in energy consumption since FY 2000.

✓ Approximately half of existing houses are rental housing.

■ **Breakdown of approximately 7.2 million existing houses**

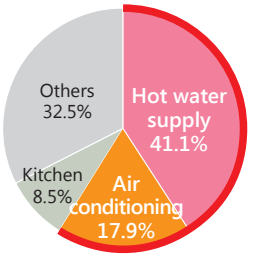


The key to measures for existing houses is improvements in thermal insulation and equipment efficiency

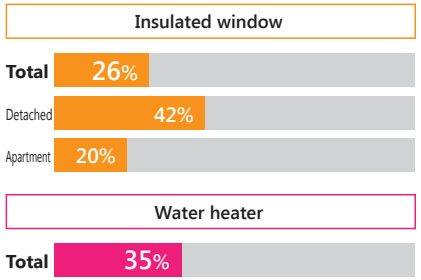
⇒ **Thermal insulation retrofits are effective means that have a variety of benefits, such as comfortable and healthy living, and energy reduction.**

⇒ **Higher efficiency of air conditioners and water heaters is important as they account for more than half of total use.**

■ **Breakdown of energy consumption**



■ **Adoption rates of highly insulated windows and high efficiency water heaters**



Effective efforts are still not widely known

- The adoption rate of highly insulated windows in Tokyo is lower than the national average of approximately 33%.
- The ownership rate of high efficiency water heaters in Tokyo is approximately 35%, showing that they have not been widely adopted yet.

TMG aims to boldly accelerate the improvement of the environmental performance of existing houses through a multifaceted approach along with housing policies.

New targets

Thermal insulation retrofits To be adopted by approx. 60% of houses by 2030, and 70% by 2035



High efficiency water heaters To be adopted by approx. 50% of houses* by 2030, and 60% by 2035 * Including new houses



Let's move forward with zero emissions for both new and existing houses



Priority Project

Doubling Thermal Insulation of Existing Houses

■ **Provide information** tailored to each resident, develop **energy efficiency diagnosis campaigns**, and **increase subsidies** for thermal insulation retrofits and energy efficient equipment along with **hands-on support** by experts. **Double the number of existing houses with thermal insulation retrofits to 3.85 million by 2035** in parallel with **an approach for health, childcare, disaster preparedness, and security**

Learn the benefits



May reduce need for nursing care



May alleviate children's allergies



Improves house's durability



Reduces utility costs



Existing detached houses & apartment buildings

Energy efficiency diagnosis campaign

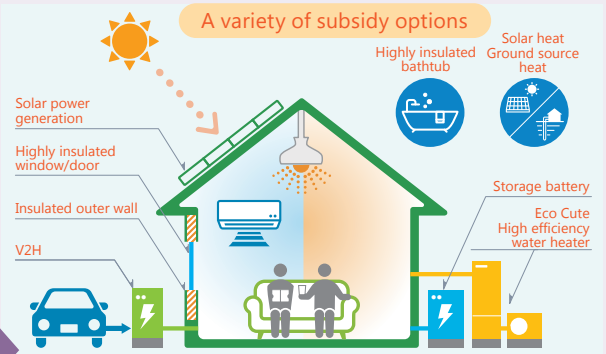
Promote energy efficiency diagnosis in cooperation with housing advisors from TMG bureaus

Detached houses	Apartment buildings
Earthquake resistance experts	Energy efficiency, renewable energy experts
Energy efficiency, renewable energy, renovation experts	Energy efficiency diagnosis experts

Hands-on support according to needs

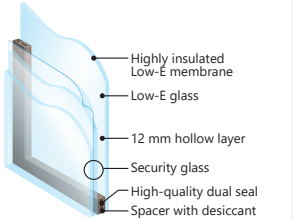
Subsidize thermal insulation, energy efficiency, and renewable energy through a variety of subsidy options

Encourage improvements in thermal insulation and the introduction of energy efficient and renewable energy equipment, taking into account security features



Approach for security

More subsidies for insulated windows with security features



Existing rental housing



Consultant provides owners with comprehensive support, from energy efficiency diagnosis to renovation

Support including diagnosis

Support including renovation

Energy efficiency performance diagnosis campaign

Intensively subsidize the expenses of energy efficiency performance diagnosis conducted by owners

Subsidy rate: 10/10



Intensively subsidize 150,000 homes from FY 2025 to 2027

Subsidies for thermal insulation and renewable energy, indication in advertisements

Subsidize thermal insulation retrofits and the introduction of renewable energy by owners

Subsidy rate: 2/3 (insulation)



Insulation with an inner window

- Energy efficiency performance indication in advertisements
- Allowing the choice of a home based on the energy efficiency performance and estimated utility costs of rental housing





Aim to insulate **1 million homes** by 2030 through initiatives that will benefit both owners and tenants of rental housing

Policy 3 Promoting Zero Emission Mobility

Necessity of promoting zero emission mobility

- The transport sector accounts for approximately 20% of CO_2 emissions in Tokyo, 80% of which comes from automobiles. It is necessary to shift to CO_2-free behaviors, such as walking and using bicycles, use more public transportation, and promote switching to ZEVs* and other non-gasoline vehicles, including HVs.
- The widespread adoption of ZEVs is expected to help strengthen energy infrastructure using their power storage and supply capabilities, and create new mobility services using autonomous driving technology. The promotion of zero emission mobility will have various effects, such as reducing impacts on health and the environment by improving air quality.

* Electric vehicles (EVs), plug-in hybrid vehicles (PHEVs), and fuel cell vehicles (FCVs) that do not emit CO_2 or other exhaust gases during driving.

Current status of promoting zero emission mobility

- TMG is promoting a shift to zero emission mobility along with support measures by establishing programs that mandate the installation of ZEV chargers in new buildings.
- The sales ratio of new non-gasoline passenger cars has increased to 63%. To ensure the wider adoption of ZEVs, it is critical to reduce vehicle prices, expand the lineup of models, and develop charging infrastructure.
- For commercial vehicles, which play a key role in expanding the use of ZEVs, sales of zero-emission models, including large buses and small trucks, have already begun.
- In these three years, the number of public fast chargers has approximately doubled due to subsidies for installation costs, and the number of chargers for apartment buildings has increased by more than eight times due to support measures for management associations.

Trends in zero emission mobility

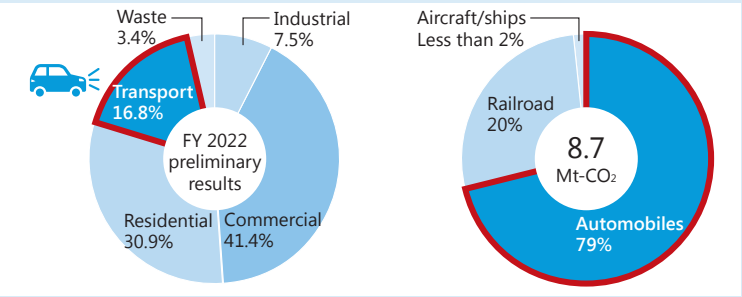
The global ZEV revolution accelerates in the medium to long term

- The global ZEV sales ratio increased to 18% in 2023 and is predicted to exceed 50% by 2035. Manufacturers are accelerating the expansion of their lineups and the improvement of battery performance as a management strategy.

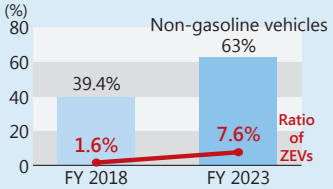
Charging infrastructure developed under the revised ordinances of TMG and the development policies of the national government

- High-power fast chargers for new residential buildings and commercial facilities have been developed in response to TMG ordinances and support measures as well as the target quantity doubled to 300,000 by the national government.

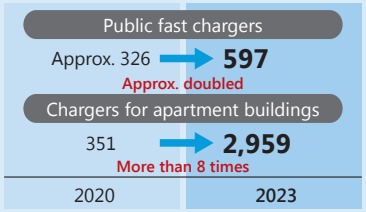
■ **Breakdown of CO_2 emissions in the transport sector in Tokyo**



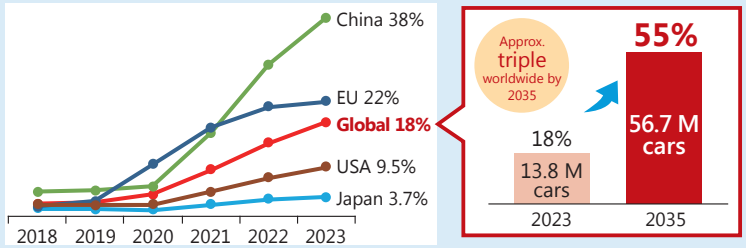
■ **Sales ratio of non-gasoline vehicles and ZEVs (passenger cars in Tokyo)**



■ **Number of chargers installed in Tokyo**



■ **Sales ratio of ZEVs worldwide (passenger cars)**



Source: "EV outlook 2024," IEA

		2023 results	2030 targets	2035 targets	2050 visions
Market share of non-gasoline vehicles in new car sales	Passenger cars	63%	100%	Maintain 100%	▶ Optimized flow of people and products ▶ All cars driven in Tokyo will be ZEVs ▶ Expanded use of renewable energy, realizing zero emissions from well to wheel*
	Motorcycles	12%	35%	100%	
Number of EV buses introduced		63	300	1,300	
Number of EV trucks introduced		2,767	35,000	70,000	
Public fast chargers		597	1,000	2,000	
Chargers for apartment buildings		2,959	60,000	120,000	

* A concept that indicates the environmental load generated through the entire process, from the stage of obtaining fuel (well) to the stage of actual driving (wheel)

Direction for Intensified Action

- Encourage the widespread adoption of zero emission mobility by **stimulating demand and promoting development**. **Decarbonize transportation** along with promoting more efficient use
- **Build a charging infrastructure** by **standardizing its installation through ordinances** and **promoting it in cooperation with businesses** in anticipation of a near-future **society with ZEVs widely adopted**

Major Efforts

Accelerating automobile decarbonization

Promoting ZEVs that demonstrate diverse value

- Accelerate the widespread adoption of ZEVs from the aspects of both use and supply by increasing subsidies for vehicles from manufacturers working to realize the green transformation, including the development of charging infrastructure, in addition to subsidies for the purchasing of ZEVs
- Promote commercial ZEVs by subsidizing the price differences between EV buses/trucks and diesel vehicles
- Encourage the introduction of used ZEVs that contribute to improving disaster preparedness on the islands with their vehicle-to-load function
- Promote the introduction of EVs/PHEVs in municipalities that work to strengthen disaster response through ZEVs
- Replace all TMG-owned passenger cars, excluding special-purpose vehicles, with ZEVs by FY 2030

■ **EV bus**



Source: Website of Isuzu Motors

■ **EV truck**



Source: Website of Mitsubishi Fuso

ZEV promotion movement to increase hands-on opportunities

- Further expand opportunities for Tokyo residents to use ZEVs through ZEV sharing and rental businesses
- Raise awareness of ZEVs and foster momentum for their introduction through events linked to Formula E, a global EV race
- Develop pioneering efforts for the use of e-mobility, including EV motorcycles, in collaboration with businesses

■ **ZEV event**



Mechanisms to encourage businesses to introduce low-emission/fuel-efficient vehicles

- Encourage businesses with large vehicle fleets to adopt ZEVs through the Vehicle Emission Regulation Program and Program for the Mandatory Introduction of Low-Emission/Fuel-Efficient Vehicles

Promoting the use of decarbonized fuels under development

- Encourage the commercialization of biofuels and the widespread use of synthetic fuels
- Promote the construction and deployment of disaster response vessels powered by biofuels
- Encourage the use of SAF* at Haneda Airport by subsidizing businesses that manufacture and supply domestic SAF

■ **Example of synthetic fuel**



* Abbreviation of sustainable aviation fuel

Developing charging infrastructure to support the expansion of ZEVs



Promote the handling of a variety of installation types

- Standardize the installation of EV chargers by mandating it for new buildings PJ
- Promote installation in apartment buildings through subsidization tailored to needs in cooperation with businesses PJ
- Enhance the charging infrastructure of businesses by subsidizing the installation and operation of chargers at facilities, as well as upgrades to support higher power capacity
- Improve the convenience of EV motorcycles by subsidizing charger and battery sharing services
- Promote the installation of EV chargers at Tokyo public housing, public corporation housing, and TMG facilities PJ

Promoting matching through public-private partnerships and workforce development

- Share information to match businesses with homeowners' associations through the Council for Public-Private Partnerships PJ
- To convert gas stations into environment-friendly multi-energy hubs, TMG will subsidize functional upgrades and business diversification, while promoting energy efficiency and workforce development

A shift to low-carbon transportation

- Strengthen decarbonized transport options by enhancing public transportation networks
- Expand cycling infrastructure and further promote bicycle-sharing systems

More efficient and rational use of automobiles

- Implement comprehensive measures to improve transportation efficiency through Tokyo Logistics Biz, including PR activities to reduce redeliveries and subsidies for installing delivery boxes in municipalities



Policy 4 Expanding the Use of Hydrogen Energy

Necessity of expanding the use of hydrogen energy

- Hydrogen is a clean energy that does not emit CO_2 when used and has excellent properties, such as reducing environmental impact, diversifying the energy mix, and providing backup capacity during emergencies.
- Derived from renewable energy, Green Hydrogen is promising as a balancing energy for renewable energy, and contributes to decarbonization in a wide range of fields, including transportation, power generation, and heat utilization.
- To establish Green Hydrogen as one of the pillars of realizing a decarbonized society, it is essential to accelerate its integration into society and stimulate demand.

Current status of expanding the use of hydrogen energy

- Key obstacles to the expanded distribution of Green Hydrogen include higher production costs, limited recognition of its environmental value, and challenges in procurement methods.
- Large commercial vehicles with long operating ranges require considerable volumes of fuel, signifying the importance of promoting the use of hydrogen.
  - ✓ Fuel cell buses have yet to achieve widespread independent adoption, primarily due to higher upfront and fuel costs compared to conventional diesel buses.
  - ✓ For fuel cell trucks, small models are currently being introduced, highlighting the need to expand the product lineup in the future.
- For hydrogen stations, it is essential to address challenges such as high installation and operating costs, and to expand the number of suitable installation sites.
- To achieve a cycle of technology development, cost reduction, increased demand, and supply chain construction, TMG is promoting public-private partnership initiatives in addition to subsidizing the installation of hydrogen stations and the production and use of Green Hydrogen.

Trends in hydrogen energy

Social implementation of Green Hydrogen accelerating around the world

- In anticipation of increased demand for hydrogen, industrial competition is intensifying, with investment in hydrogen equipment underway around the world.

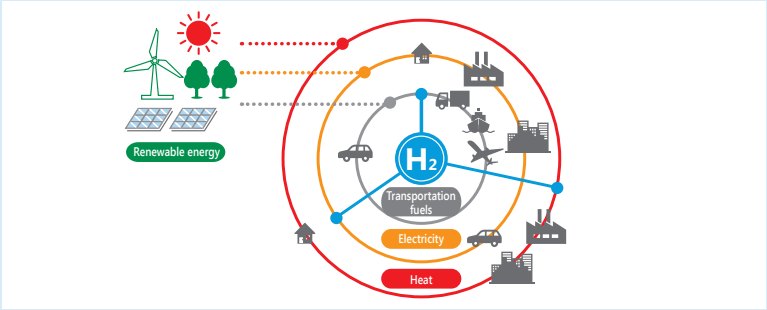
National government speeding up hydrogen energy strategy

- With its strengths in hydrogen-related technologies, Japan is accelerating the social implementation of hydrogen energy by promoting intensive investment in building the supply chain as evidenced by the revision of the Basic Hydrogen Strategy and enactment of the Hydrogen Society Promotion Act.

Companies also advancing hydrogen energy initiatives

- Production of fuel cell commercial vehicles is expanding, with large trucks expected to be introduced from FY 2025 onwards. A variety of equipment and technologies are being developed, including power generation using hydrogen boilers or hydrogen–fuel mixtures, and hydrogen-based ironmaking.

Green Hydrogen used in various fields



TMG's efforts for a cycle


Fuel cell bus
Source: Bureau of Transportation, TMG

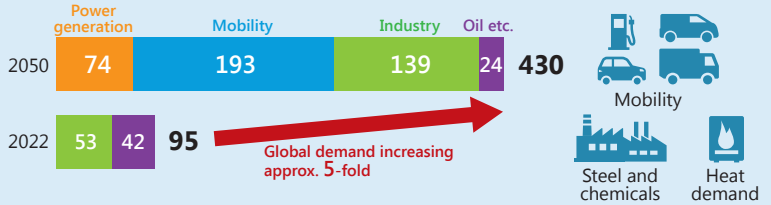

Facility utilizing Green Hydrogen
Source: Toshiba Energy Systems & Solutions Corp.



Fuel cell light truck
Source: Commercial Japan Partnership Technologies


Image of building a supply chain

Global demand for hydrogen and oil in Mt/year



Source: "Trends in Hydrogen at Home and Abroad and Status Quo of Hydrogen Policy," Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry

	2023 results	2030 targets	2035 targets	2050 visions
Establishing a Green Hydrogen supply system	Start of supply from other prefectures	Increase in supply from other prefectures in addition to production in Tokyo	Establishing a supply system at home & abroad	▶ **Stable supply of inexpensive Green Hydrogen in the wider area of Tokyo through a pipeline network. Green Hydrogen will be utilized in various sectors—including industry and power generation—becoming a widely accessible energy source for Tokyo residents**
Number of fuel cell commercial vehicles introduced	197	Approx. 5,000	Approx. 10,000	
Number of hydrogen stations for commercial vehicles	23	Approx. 40	Approx. 100	

Direction for Intensified Action

■ To promote the production, transportation, and utilization of **Green Hydrogen**, TMG will encourage its **social implementation** through efforts on **both the supply and demand sides**, building domestic and international supply chains for it and expanding its introduction to commercial vehicles and the industrial field

Major Efforts

Establishing a Green Hydrogen supply system for its widespread adoption

Expanding the production of Green Hydrogen and building a pipeline supply system

- Promote the deployment of Green Hydrogen in Tokyo by establishing production facilities on TMG-owned land (Keihinjima and Central Breakwater Reclaimed Land) PJ
- With an eye to accepting hydrogen from overseas, TMG will promote efforts to build a pipeline supply system, such as holding council meetings and subsidizing feasibility studies by businesses

Promoting the installation of hydrogen stations

- Promote the widespread adoption of hydrogen stations by expanding subsidies for installation and operation costs and providing hands-on support for small and medium-sized businesses in opening their stations
- Install Japan's first hydrogen station in a bus terminal using TMG-owned land, and Tokyo's first Green Hydrogen station

■ **Japan's first hydrogen station in a bus terminal in Koto Ward**



Source: Iwatani Cosmo hydrogen station LLC

■ **Tokyo's first Green Hydrogen station in Shinjuku Ward**



Source: Tomoe Shokai Co., Ltd.

Creating hydrogen demand across various forms of mobility

- Boost hydrogen demand in Tokyo by subsidizing the introduction and fuel costs of fuel cell buses, taxis, and trucks
- Promote hydrogen use in commercial vehicles by providing subsidies for the adoption of fuel cell garbage trucks and forklifts
- Support the expansion of hydrogen mobility and the installation of hydrogen stations through integrated measures, including generating mobility demand and facilitating partnerships with hydrogen station operators
- Promote the replacement of ground support equipment with fuel cell-powered alternatives
- Deploy more Toei Buses with fuel cells and introduce TMG-owned hydrogen fuel cell ships

■ **Aircraft towing vehicle**

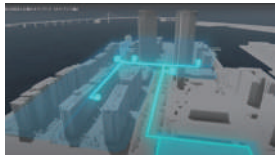


Accelerating the utilization of hydrogen in the industrial field and urban development

Large-scale utilization of hydrogen in the industrial field and the social implementation of hydrogen-use equipment

- Promote the industrial use of Green Hydrogen by implementing a pilot project to use Green Hydrogen produced in Tokyo as a raw material in cosmetic manufacturing within the chemical industry
- Conduct trial production of green methane using Green Hydrogen produced in Tokyo and biomass-derived CO_2 from Morigasaki Water Reclamation Center
- Promote the adoption of Green Hydrogen by subsidizing businesses that introduce equipment for the production, transportation, or utilization of Green Hydrogen, and by recognizing early adopters of Green Hydrogen through a certification program PJ

■ **Image of supply to blocks**



Utilization of hydrogen in the Tokyo Waterfront City serving as a model across the country

- Encourage the use of hydrogen in urban development, as shown by the hydrogen supply to residential blocks via pipelines at the former Olympic Village in Harumi—the first practical application of its kind in Japan
- Promote hydrogen use in the Port of Tokyo and Tokyo Waterfront City in cooperation with private businesses by introducing fuel cell-powered cargo handling equipment and hydrogen-fuel mixture combustion boilers for district heating

■ **Hydrogen mixed combustion boiler**



Source: Hirakawa Corporation

Building a hydrogen supply chain through domestic and international cooperation

- Promote the use of Green Hydrogen produced in other prefectures in Tokyo by concluding an agreement to expand its supply and demand PJ
- Expand the trial trading of Green Hydrogen to establish a hydrogen exchange PJ
- Encourage the creation of an international supply chain by hosting the international HENCA conference and collaborating with overseas jurisdictions under existing agreements

■ **HENCA Tokyo**



Priority Project

Building a ZEV Charging Infrastructure That Allows Charging at Any Time in a Nearby Location

■ **Through its mandatory programs, support measures, initiatives, and public-private partnerships, TMG will focus on developing a convenient and accessible charging infrastructure**—an essential foundation for the widespread adoption of ZEVs

Promoting standardized installation in new buildings

- In anticipation of a future society where ZEVs are widely used, TMG will require the installation of charging equipment in new buildings starting in April 2025.
- Installing chargers during construction ensures a smooth rollout tailored to user needs and contributes to enhancing the asset value of the buildings. It is also more economical than installation after buildings start operations.

Installation standards for large buildings

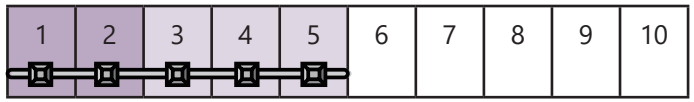
Categories	No. of parking spaces	Charger installation criteria	Piping etc. installation criteria
Reserved parking	5 or more	20% or more of spaces	50% or more of spaces
Shared parking	10 or more	1 or more spaces	20% or more of spaces

Example of installing chargers in a reserved parking lot with 10 parking spaces



Chargers installed on two spaces





Piping etc. installed on five spaces

Expanding charger installation through support measures

- With approximately 70% of households in Tokyo living in apartment buildings, TMG will provide substantial subsidies for the installation of chargers in these residences, aiming to significantly accelerate their widespread adoption.
  - ✓ TMG will promote support measures according to the needs of management associations and other organizations at each stage from consideration to introduction and operation.



Consideration stage

Portal site

Seminars & consultations

Dispatch of condominium management advisors

Free individual consultations with charging service providers

Subsidies for on-site survey costs



Introduction stage

Subsidies for installation costs

Subsidies for equipment and construction costs

10/10 subsidization in principle by the national gov.
Increasing subsidies for mechanical parking

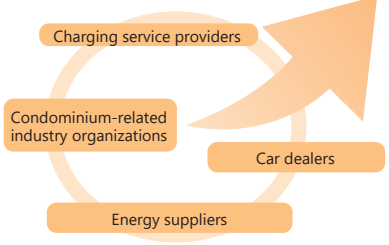


Operation stage

Subsidies for running costs

Subsidies for demand charges

Subsidizing for up to 3 years



Collaborative council to promote the expanded use of chargers at condominiums

Decisive support for apartment buildings in cooperation with charging service providers and other organizations

Aiming to install 120,000 chargers at apartment buildings by 2035

(Tachikawa Joint Government Building)



Promoting TMG's initiatives for its own sustainability

- Installing public chargers at TMG facilities
  - ✓ To provide a more convenient charging infrastructure throughout Tokyo, TMG aims to install 780 chargers in total by 2030.
- Installing pipes on public roads

  (Six chargers already installed near Shiba Park, Tokyo Station, etc.)
  - ✓ These chargers have been installed to complement the task of private businesses.

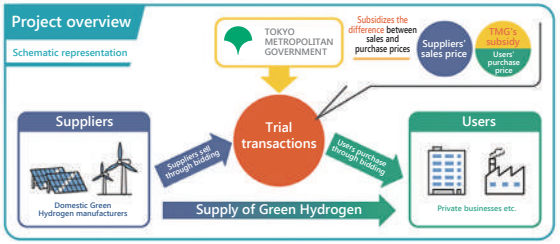
Priority Project

Working with Other Prefectures to Expand the Green Hydrogen Network

■ Pave the way for the **full-scale use of Green Hydrogen** in the future, **revitalizing transactions, evaluating and utilizing environmental value, and promoting the use of Green Hydrogen in cooperation with other prefectures**

Initiatives for launching a Green Hydrogen exchange

- Conduct trial transactions of Green Hydrogen to create trading opportunities and encourage broader adoption
- Test a double auction system, where sales and purchase prices are determined by bidding, and use subsidies to offset price gaps
- Continue trial transactions to stimulate both demand and supply, paving the way for more active commercial trading



Providing support for businesses taking the lead in using Green Hydrogen

- Japan's first program to certify businesses that take the lead in using Green Hydrogen
- Provide subsidies according to certification categories and the amount of Green Hydrogen used

Green Hydrogen Leadership Business

Certification categories	Description
On-site (local production and consumption)	Produces renewable electricity independently and uses it to produce and consume Green Hydrogen with equipment located within facilities in Tokyo
On-site	Receives renewable electricity from external sources and uses it to produce and consume Green Hydrogen with equipment located within facilities in Tokyo
Off-site	Procures Green Hydrogen produced elsewhere in Japan and utilizes it with equipment located within facilities in Tokyo

Utilizing Green Hydrogen in collaboration with other prefectures

TMG promotes the widespread use of Green Hydrogen by partnering with prefectures that specialize in hydrogen production through formal agreements

Collaboration with Yamanashi Prefecture

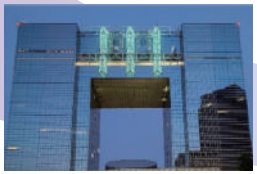


Hydrogen produced in Yamanashi Prefecture

Used in Tokyo

Tokyo Big Sight



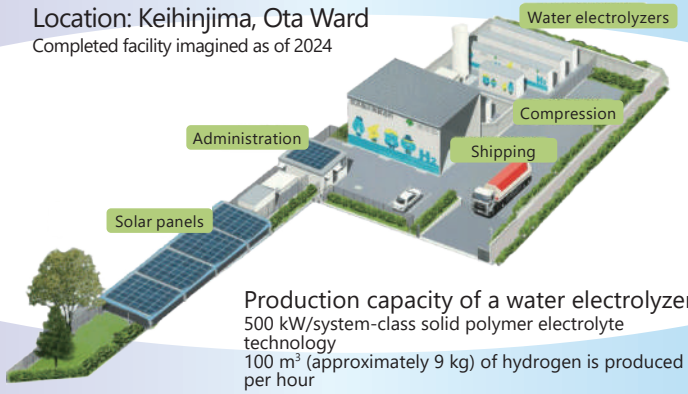


Lighting at Telecom Center Building

Producing hydrogen on TMG-owned land in collaboration with Yamanashi Prefecture

Location: Keihinjima, Ota Ward

Completed facility imagined as of 2024



Production capacity of a water electrolyzer

500 kW/system-class solid polymer electrolyte technology

100 m^3 (approximately 9 kg) of hydrogen is produced per hour

Hydrogen station in Tokyo





Collaboration with Fukushima Prefecture



Hydrogen produced in Fukushima Prefecture

Used in Tokyo

Policy 5 Shift to a Circular Economy - Promotion of the Sustainable Use of Resources

Necessity of the sustainable use of resources

- The linear economy—based on mass production, consumption, and disposal—imposes a significant burden on the environment, contributing to climate change through increasing waste and CO_2 emissions, and posing a long-term risk of resource depletion.
- Estimates suggest that if everyone in the world lived like the average resident of Tokyo, we would require the resources of 3.1 Earths.
- For a city like Tokyo, which depends heavily on other regions for both resource supply and waste management, transitioning to a circular economy that prioritizes resource reuse and minimizes the need for new input is essential.

Current status of the sustainable use of resources

- TMG has established the Tokyo Circular Economy Promotion Center (T-CEC) at the Environmental Public Service Corporation to provide multifaceted support, such as disseminating information to Tokyo residents and businesses as well as facilitating business matching.
- Aiming for sustainable resource management, TMG supports businesses that are working on the social implementation and expansion of 2R (reduce & reuse) businesses and closed-loop recycling.
- The recycling rate of municipal solid waste, an indicator of sustainable resource management, rose to 24.8% in FY 2022 across Tokyo. Notably, the Tama Area reached the 2030 target of a 37% recycling rate ahead of schedule.

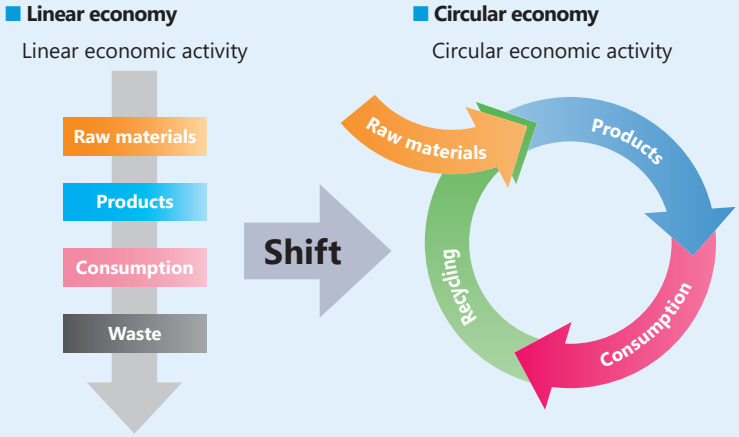
Trends in the sustainable use of resources

Rapid global shift to a circular economy as a new source of competitiveness

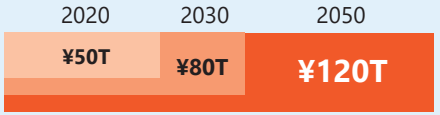
- Circular economy initiatives are gaining momentum worldwide, driven by regulatory measures such as the EU's mandatory program for the use of recycled materials, and by the growing commitment of global companies to use recycled materials.
- In Japan, the transition to a circular economy is being promoted as a national strategy. This effort is supported by the Act on Promoting the Advancement of Recycling Businesses to Facilitate Resource Circulation, enacted in May 2024, and the Fifth Fundamental Plan for Establishing a Sound Material-Cycle Society, formulated in August of the same year.

Expansion of circular economy business

- "Artery-vein" collaboration between manufacturers and recyclers is underway, including bottle-to-bottle and solar panel recycling.
- Through collaboration between companies involved in technology development, manufacturing, and distribution, local governments, and other organizations, the business of producing SAF from waste cooking oil and other raw materials for use as aircraft fuel is expanding.



Market size of circular economy in Japan



*A private estimate indicates that the global market size will be $25 trillion by 2050.
Source: "Accelerating the Circular Economy (2024)," Ministry of Economy, Trade and Industry

Approaches to circular economy in the EU and US

Construction of a circular economy zone through regulatory measures	De facto standardization through competition among leading companies
• Regulation through a sustainable product policy framework • International standardization, including the measurement of circularity • Strengthening regulations on transboundary movements	• Apple manufactures products using recycled/recyclable materials only • Microsoft aims to eliminate waste from business, products, and packaging

Source: "The Third Expert Working Group Meeting for the Realization of GX in 2023," Cabinet Secretariat

	2022 results	2030 targets	2035 targets	2050 visions
Municipal solid waste recycling rate	24.8%	37%	Approx. 40% (guideline*) * Discussed by the Tokyo Metropolitan Waste Council	▶ **Sustainable use of resources established** • Minimized CO_2 emissions per unit of the amount of resources used and consumed

Direction for Intensified Action

- Accelerate the shift to a circular economy by recognizing and showcasing the excellent efforts and ingenuity of businesses involved in sustainable resource management, thereby inspiring the wider industry, fostering the creation of new business models, and integrating them into society
- Promote circular use, changes in consumer behavior, and diverse collaboration between businesses throughout the supply chain by means of digital and other technologies

Major Efforts

Advanced processing and recycling

- To ensure the proper separation and safe collection and processing of lithium-ion batteries, TMG will promote their recycling through wide-area collection and public awareness campaigns in cooperation with municipalities
- Enhance the recycling initiatives of businesses by subsidizing the introduction of advanced processing equipment, such as crushing and sorting equipment for plastics and metals including rare metals
- Promote advanced circular use by subsidizing recycling costs, the introduction of advanced recycling equipment for solar panels, and the installation of storage and transshipment facilities PJ
- Foster pioneering businesses that work to advance sustainable resource management and waste processing by subsidizing the creation of businesses that utilize cutting-edge technology, such as creating optimal collection routes and automatically sorting recyclable materials through AI

Effective use of waste through an artery-vein collaboration

- Encourage the utilization of recycled resources, such as using recycled crushed stone and aggregate concrete made from construction waste and using ash from incineration plants as a raw material for cement

- In order to accelerate the widespread adoption of SAF, TMG will work with municipalities and companies to encourage, as an all-Tokyo effort, the production of SAF from waste cooking oil and waste materials as well as its use in the aviation industry

■ **Collection of waste cooking oil at a store using returnable bottles**



- To integrate fiber-to-fiber recycling into society, TMG will demonstrate the collection and recycling of used clothing in collaboration with businesses to encourage the development of technology and the establishment of a production system

Promoting lifestyle changes among Tokyo residents and businesses

- At T-CEC, TMG will showcase best practices from leading companies and facilitate cross-industry business matching—such as between office building operators and equipment manufacturers—to promote co-creation and innovation
- Encourage behavioral change among businesses by incorporating self-diagnosis tools and online consultations, using digital transformation, into 3R-related recommendations

- Promote food waste reduction, effective use of resources, and energy efficiency action through Team Mottainai*

チーム もったいない

* A loose framework aimed at changing the consumption behavior of individuals, companies, and other entities

- To encourage consumption behaviors that consider people, society, and the environment (ethical consumption), TMG will share information and carry out collaborative projects with companies and organizations

ちょっと考えて、ぐっといい未来
エシカル消費

Building the foundation for a circular economy

- To create a green product market, TMG will encourage the development, production, and branding of green products through collaboration among companies within the supply chain
- Establish circular economy indicators and improve corporate value, thereby facilitating the integration of an urban circular economy model into society through soft infrastructure and systems
- Advance recycling technologies and improve waste management by collaborating with cities in Japan and abroad, including joint training programs with officials from other Asian cities

Policy 5 Shift to a Circular Economy - Promotion of Measures for Plastics

Necessity of promoting measures for plastics

- Plastics are widely used in everyday life and businesses, for example in food storage and as lightweight materials, but many are discarded after a single use, prompting the need to reconsider our use of disposable resources.
- From crude oil extraction to disposal, plastics are closely linked to CO_2 emissions at every stage of their lifecycle. A large portion of discarded plastics is either incinerated or used for heat recovery.
- In addition, an estimated 4.8 to 12.7 million tonnes of plastics enter the oceans each year. At the current pace, the volume of plastics in the ocean is projected to exceed that of fish by 2050, posing a serious threat to marine ecosystem.

Current status of promoting measures for plastics

- TMG is promoting the social implementation of 2R business and closed-loop recycling in cooperation with businesses, and taking the initiative in plastic recycling at TMG Buildings.
- To help recycle containers and packaging, which account for a large part of plastic waste from households, TMG provides technical and financial support for municipalities in promoting the separate collection of plastics.
- Incineration of plastic waste from households and large office buildings in Tokyo amounts to approximately 700,000 tonnes, resulting in 1.45 million tonnes of CO_2 annually.

Trends in measures for plastics

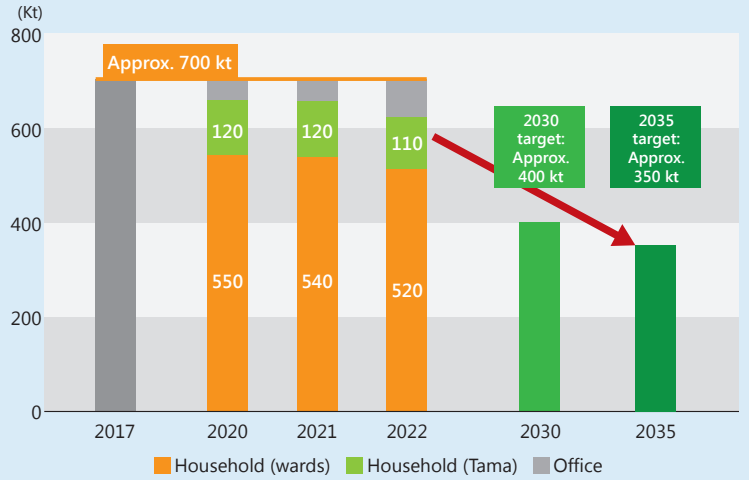
Accelerating movement toward the sustainable use of plastics

- The amount of plastic used worldwide has doubled from 2000 to approximately 400 million tonnes in 2019, and the OECD predicts that it will increase to more than 700 million tonnes by 2040.
- While negotiations are underway for international treaties on measures for plastic pollution, there is a movement in Japan to make it mandatory for manufacturers to formulate plans for the use of recycled plastics.

Expansion of municipal initiatives, co-creation started by pioneering companies

- An increasing number of municipalities in Tokyo have begun to separate and recycle plastic containers, packaging, and products. Efforts for collaboration and co-creation between companies across industries have also started.

Trends in plastic incineration



Support for the recycling of plastic containers, packaging, and products

TMG provides start-up support for the planning and implementation stages of separate collection for plastic containers, packaging, and products, as well as improvement support for enhancing separate collection practices.

(Figures indicate No. of municipalities)

Categories	2020	2021	2022	2023
Start-up support provided to municipalities that have not yet introduced separate collection	3	4	11	16
Improvement support offered to municipalities that already conduct separate collection	4	6	4	4

	2022 results	2030 targets	2035 targets	2050 visions
Incineration of plastic waste from households and large office buildings compared to FY 2017	Approx. 700,000 t	40% reduction	50% reduction	▶ **Plastic use with net zero CO_2** • Plastic production and recycling covered by renewable energy • Switched to biomass causing no land-use change, limited by the growth rate of plants, and with consideration for social and environmental issues, such as competition with food production

Direction for Intensified Action

- Review of disposable consumption habits and the promotion of the mainstream adoption of 2R businesses, including reusable containers and sharing services
- Promote the social implementation of closed-loop recycling, such as switching from the incineration of office plastics to material recycling, in order to advance circular use

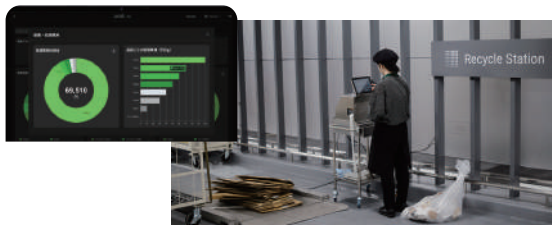
Major Efforts

Review of single-use plastics and promotion of recycling, primarily at office buildings

- Provide support for the launch and expansion of 2R and closed-loop recycling businesses for plastic resource circulation, with collaboration between businesses and organizations
- Encourage community-based initiatives at T-CEC, by supporting regional projects and research for future social implementation, and by disseminating information to encourage the use of thermal flasks
- Dispatch 3R advisors to offer on-site, tailored recommendations to advance 3R practices, with a focus on reducing plastic waste in office buildings
- Enhance the recycling initiatives of businesses by subsidizing the introduction of advanced processing equipment, such as crushing and sorting equipment for plastics
- Promote the recycling* of plastics discharged from TMG buildings and the bottle-to-bottle recycling of plastic bottles

* Crushing and washing plastics to turn them into flakes or pellets used as raw material for new plastic products

Digital depiction of recycling emissions at Tamagawa Takashimaya SC Recycling Station

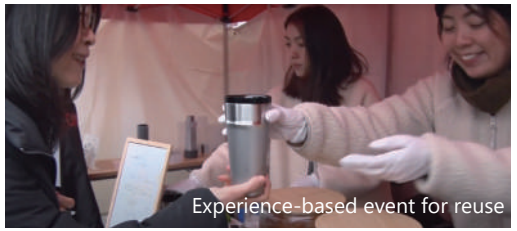


Source: Recotech Co., Ltd.

Promotion of separation and recycling, primarily at households

- Provide support for municipalities expanding the separate collection of plastic containers, packaging, and products to develop the initiative throughout Tokyo
- Encourage local initiatives by supporting municipalities in lending out reusable containers at events, and raising awareness among Tokyo residents through experiences using reusable containers
- Support the island municipalities in collecting marine litter and debris that drift ashore, and promote Zero Marine Litter Action with initiatives such as fact-finding surveys and campaigns for raising public awareness of marine litter

Awareness-raising through eating and drinking experiences using a reusable container sharing service





Promotion of major efforts toward 2050

	–2035	–2050
Office buildings etc.	Controlling the generation of plastic waste through 2R businesses, accelerating the adoption of closed-loop recycling	Significant reduction in plastic waste due to the widespread adoption of 2R and closed-loop recycling
Households etc.	Expanding the separate collection of plastic containers, packaging, and products throughout Tokyo	Net-zero plastic waste in the residential sector due to separation and recycling enhanced in cooperation with municipalities

Policy 5 Shift to a Circular Economy - Promotion of Measures for Food Waste

Necessity of promoting measures for food waste

- In Japan, 4.72 million tonnes of food was wasted in FY 2022. This is equivalent to throwing away one bowl of rice per person every day, resulting in a loss of approximately 30,000 yen per person each year.
- Greenhouse gases emitted for producing and manufacturing discarded food are estimated to account for 21 to 37%* of the entire global food system. The impacts of food waste on climate change cannot be overlooked.

* Source: "Climate Change and Land" (2019), IPCC

Current status of promoting measures for food waste

- TMG is promoting effective measures through the Tokyo Food Waste Reduction Partnership Council which consists of organizations related to manufacturing, wholesale, retail, restaurant and consumer groups, and experts.
- The amount of food wasted in Tokyo steadily decreased due to the impact of COVID-19* and the efforts of businesses. It was 317,000 tonnes in FY 2022, achieving the FY 2030 target of approximately 380,000 tonnes ahead of schedule.
- In Tokyo, business food waste accounts for approximately 60% of all food waste, of which the restaurant industry accounts for approximately 60%.

* Coronavirus disease 2019

Trends in measures for food waste

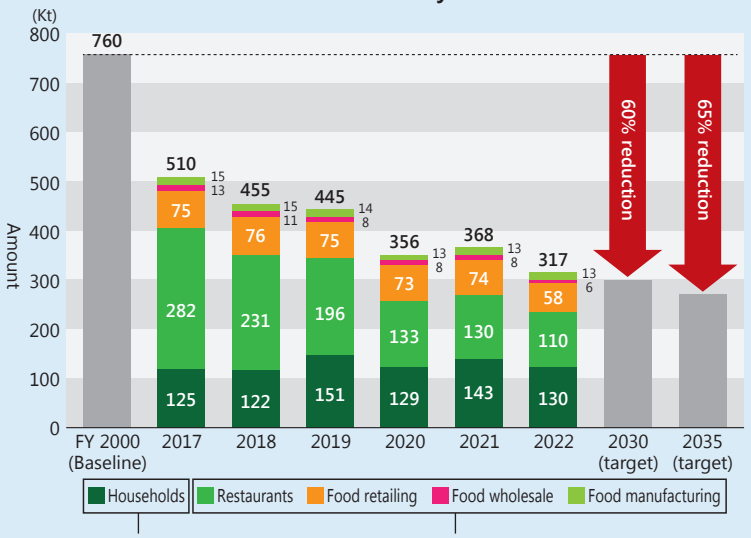
The national government set a new target for business food waste and accelerated efforts for further reduction

- Having achieved its target of halving business food waste ahead of schedule, the national government has updated its basic policy for reducing food waste and set a new target of reducing it by 60% by 2030, promoting initiatives such as preventing leftovers and encouraging takeout.

The food industry is undergoing rapid transformation along with social conditions and technological advances

- There are concerns about food waste caused by the recovery of the restaurant industry and an increase in inbound tourists after the COVID-19 pandemic.
- In response to environmental awareness and diverse food demand, new businesses using Food x Technology and new services, such as demand forecasting using AI in the food distribution process, are being implemented.
- The impact of rising prices of food on people in poverty is aggravated, increasing the need for food donations through food banks.

Trends in the amount of food waste in Tokyo



Household food waste
Leftovers, disposal due to expired best-before dates, excessive removal of edible parts, etc.

Business food waste
Leftovers at restaurants, unsold products, products past sales deadlines, etc.

Examples of food waste reduction by a company using advanced technology



Smart refrigerator that uses an AI camera to manage inventory and suggest recipes using stored vegetables

Source: Website of Panasonic Corporation



Craft beer brewed using TMG's emergency food stock that was nearing its disposal date

Source: Website of Beer the First Co., Ltd.

	2022 results	2030 targets	2035 targets	2050 visions
Food waste compared to FY 2000	58.3% reduction (approx. 317,000 t)	60% reduction * Changed from 50% reduction	65% reduction	▶ **Net zero food waste** • Maximized efforts to curb food waste and virtually eliminate remaining food waste by converting it into feed and fertilizer

Direction for Intensified Action

- Prioritizing the curbing of food waste, TMG will promote a wide range of initiatives to effectively use surplus food and recycle food waste that happens unavoidably
- Actors across the entire supply chain will work together to promote food waste reduction throughout society, leveraging their respective technologies to make participation accessible and practical for all

Major Efforts

Totally curbing food waste

Shift to a circular society focusing on curbing food waste

- Strengthen measures for the restaurant industry by creating comprehensive guidelines and videos tailored to business styles and inbound tourists as well as holding seminars in cooperation with industry groups and local governments
- Reduce food waste at restaurants through campaigns for no leftovers and promoting the use of take-home containers
- Promote lifestyle changes at home by developing the Tokyo Zero Food Waste Campaign, designed to be applied in various everyday situations

Utilizing advanced technology for food waste reduction

- Promote food retail sector initiatives by offering comprehensive support for the adoption of effective food waste reduction measures, such as freezing technologies that extend shelf life and AI-based systems for demand forecasting

Promoting initiatives in the food supply chain

- Share efforts and knowledge concerning measures to reduce food waste at distribution and other stages at the Tokyo Food Waste Reduction Partnership Council
- At T-CEC, TMG will foster momentum among a wide range of entities, from food-related companies to users, by sharing case studies and raising awareness in collaboration with businesses, experts, and university students

Promoting the effective use of surplus food

- Encourage the expansion of food donations by using the food donation guidelines to promote the networking of support organizations where food can be donated
- Use a matching system to create an environment where emergency food stockpiled at TMG and municipalities nearing its best-by date can be donated to food banks and other organizations
- Promote food drive activities* in collaboration with local governments and companies with a donation desk set up at events in Tokyo
- Provide support for municipalities working to upcycle food that is nearing its disposal date

* Activities in which ordinary people bring surplus food from their homes and donate it to food banks and other organizations

Promoting the recycling of food loss and waste

- Provide support for municipalities and retailers working to convert food residue into fertilizer and biogas
- Promote food recycling and zero waste practices tailored to each region, based on advanced examples of the sustainable resource management of garbage, such as turning food loss and waste into feed and fertilizer

Compost garbage from households



Promotion of major efforts toward 2050

	–2035	–2050
Curbing food waste	Social implementation of advanced technologies, establishment of no leftovers and taking leftovers home	Using AI and other tools to curb oversupply
Effective use	Widespread adoption of the use of surplus unused food through matching systems and food drives	Effective use through food sharing and other means becoming the norm
Recycling	Creating and expanding best practices in cooperation with municipalities	Net zero waste through the adoption of food recycling

Priority Project

Promoting Sustainable Resource Management by Recycling Solar Panels

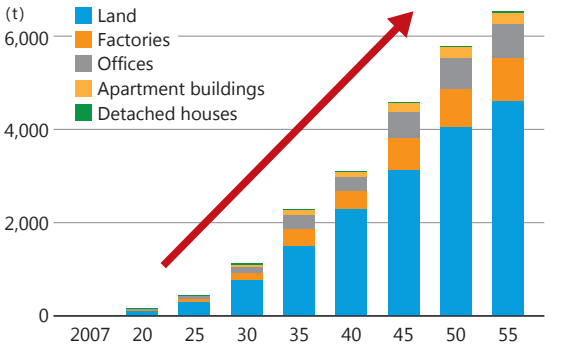
■ **The installation of solar power generation equipment became mandatory** in FY 2025. **In anticipation of an increase in waste in the future**, TMG will **strengthen the foundation for recycling residential solar panels in collaboration with relevant businesses**.

All residential solar panels to be recycled

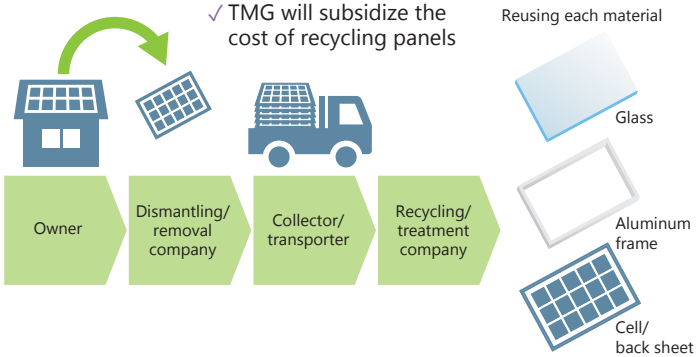
- A variety of recycling facilities are already in operation, undertaking the treatment of solar panels in preparation of mass disposal in the future.
- TMG will work with businesses to accelerate the strengthening of the recycling infrastructure by utilizing existing recycling routes as well.
- The national government will submit a bill regarding mandatory recycling. With an eye on the national government strengthening its measures, TMG will continue to steadily advance its efforts.

Disposal amount will increase from the mid-2030s

■ **Disposal amount of solar power generation equipment**



TMG will establish a recycling infrastructure for solar panels

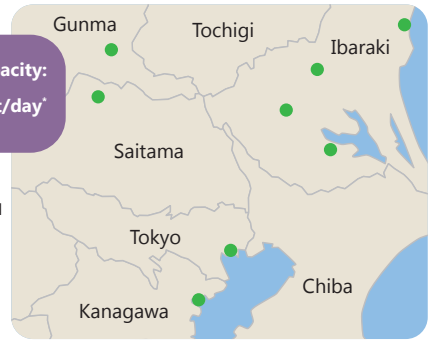


Recycling in cooperation with facilities in the Tokyo metropolitan area

■ **Eight recycling facilities designated by TMG as of the end of FY 2024**

Treatment capacity: Approx. 75 t/day*

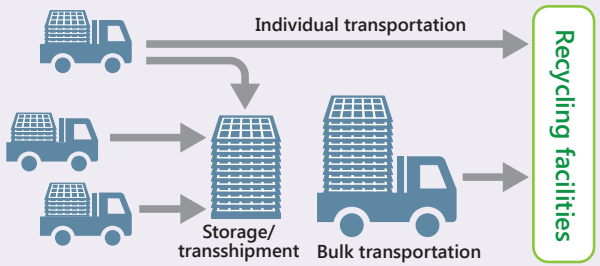
*Includes facilities other than those dedicated to panel recycling



Intensified action

Improve the quality and increase the quantity of recycling through efficient collection/transportation and advanced treatment equipment

① Support for the installation of storage/transshipment facilities



② Support for the introduction of advanced recycling equipment



Source: "Guidelines for Promoting the Recycling of Solar Power Generation Equipment (Third Edition)" (2024), Ministry of the Environment

Efforts at the Council for Advanced Circular Use of Solar Power Generation Equipment



- Collaboration with house builders and other businesses
- Collaboration with Kawasaki City which has mandated the installation of solar power generation equipment
- Raising awareness among Tokyo residents and businesses

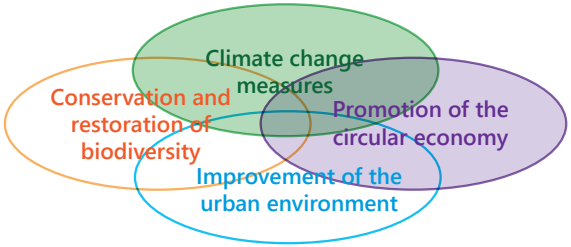
Realizing the sustainable use of energy by accelerating the advanced circular use of solar panels to **balance the use of renewable energy and effective use of resources**

Topic

Circular Economy: An Economic Model That Contributes to Decarbonization

Bring the circular economy into your daily lives!

- Adding just a few small improvements to your everyday life can help reduce waste of resources. Get started by doing what you can! For example, choosing recycled products, using sharing services, and donating items in good condition rather than just throwing them away.





Companies should use recycled materials for manufacturing

Reduce resource inputs

Upcycling
Buy sweets made from inedible parts of fruits and vegetables or alcohol made from bread crusts





Reusable, high quality, and/or highly durable products
Choose reusable cups and products with a long lifespan

Buy

You can also choose **not to buy**

Sharing
Use services you need when you need them. For example, car sharing or furniture and daily necessities rentals

Local production and consumption
Use local markets



Rent, borrow

Separate



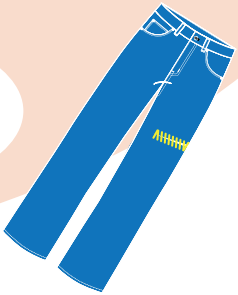
Separate and collect recycling
Separate paper and plastic bottles as recyclable waste, and take unnecessary clothing to stores for collection



Flea markets and food drives
Sell or give away books, clothes, or food no longer needed to a new owner

Sell, give away

Repair services
Have frayed parts of clothing repaired to make them last longer



Repair

Topic

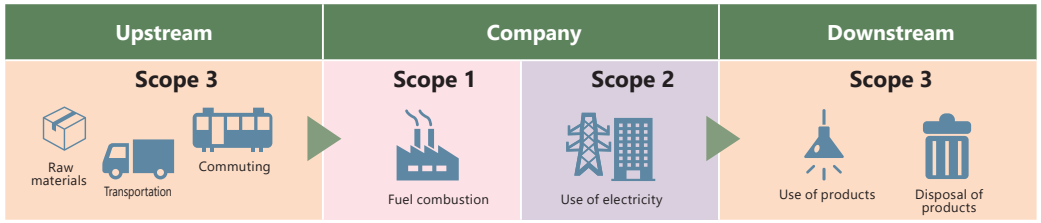
Decarbonizing the Whole of the Supply Chain - Scope 3

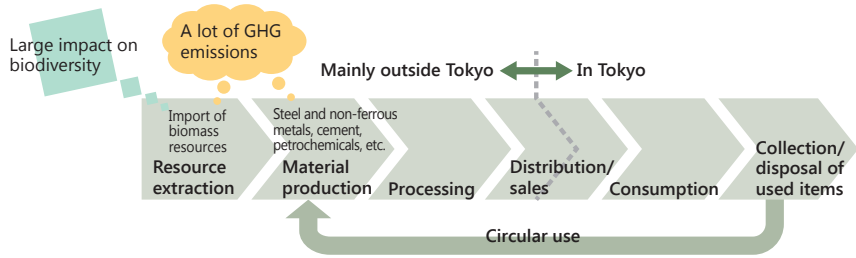
What is Scope 3? The need for Tokyo to work on Scope 3

- Scope 3 refers to the greenhouse gas (GHG) emissions generated by external entities related to a company's business activities. For example, before a product reaches a consumer, it passes through numerous processes, each potentially contributing to GHG emissions. Additional emissions often occur during and after disposal. To reduce greenhouse gas emissions, efforts across the whole of the supply chain* are essential.
- Tokyo, as a city with a high concentration of corporate headquarters, consumes a significant amount of resources and natural capital through its urban activities, both from within the city and beyond. To fulfill its responsibility as a major global city, Tokyo must advance its sustainability efforts with a clear focus on Scope 3 emissions.

* Supply chain emissions include those from a series of processes: Raw material procurement, manufacturing, distribution, consumption, and disposal.

Greenhouse gases in the supply chain classified into three categories





Growing momentum toward decarbonization across the entire supply chain

- In 2023, an international standard for the disclosure of sustainability-related financial information*1 was released. In March 2025, a Japanese version of the disclosure standard*2 covering Scope 3 was announced, and its application to large companies*3 from 2027 is under consideration. Efforts to calculate and reduce greenhouse gas emissions throughout the supply chain including small and medium-sized businesses are being strengthened at home and abroad.
- A calculation tool for whole life carbon*4 (WLC) of buildings has been published, and the national government has started considering a program to check the life-cycle CO_2 emissions of buildings. In addition, a movement to select lower-carbon materials has begun, with startups providing system tools for Scope 3 calculations.

*1 An international standard for companies to disclose non-financial information including ESG, formulated by the International Sustainability Standards Board (ISSB). *2 Presented by the Sustainability Standards Board of Japan (SSBJ).
*3 Disclosure should cover Scope 3 in principle. *4 CO_2 emissions from the construction to demolition of buildings.

TMG is promoting its initiatives with Scope 3 in mind

Procurement by TMG including goods and construction

- Gradually introduce the perspective of Scope 3 when procuring goods and services, such as printers and materials for public works, such as low-carbon asphalt
- Promote sustainable procurement that takes into consideration environmental, human rights, labor, and economic factors by establishing the Tokyo Metropolitan Government Socially Responsible Procurement Guidelines. These guidelines require contractors and businesses within the supply chain involved in TMG's projects to adhere to responsible practices

CO_2 reduction during construction

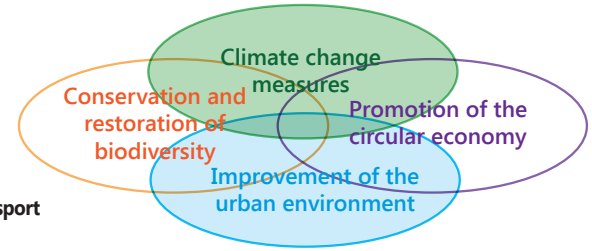
- Promote measures for emissions in the construction supply chain by incorporating a mechanism for monitoring and reducing CO_2 emissions during construction and evaluating the use of low-carbon materials into the Tokyo Green Building Program for new buildings

Subsidies for companies working on Scope 3

- Subsidize small and medium-sized businesses working to depict and reduce CO_2 emissions, including those categorized under Scope 3
- Provide financial support to businesses that use air cargo transportation with SAF to help offset the additional costs associated with reducing Scope 3 emissions

Topic

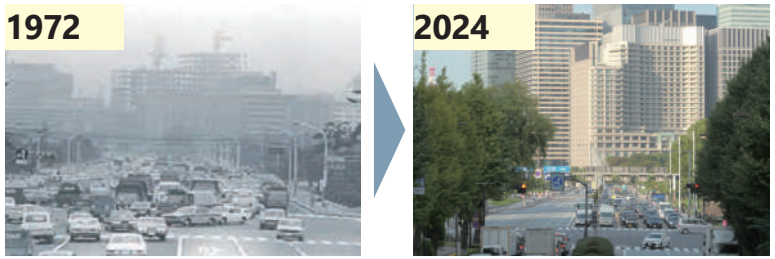
Improving Air Quality and Climate Change Measures Are Connected



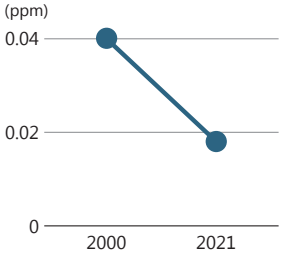
Tokyo's skies becoming clean as CO_2 emissions from automobiles are reduced

- Tokyo's air pollution was serious, but now the skies are very clean. CO_2 emissions in the transport sector have also been reduced.

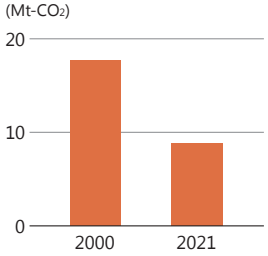
■ Iwaidabashi Intersection, Chiyoda Ward



■ NO_2 concentration in Tokyo at roadside stations



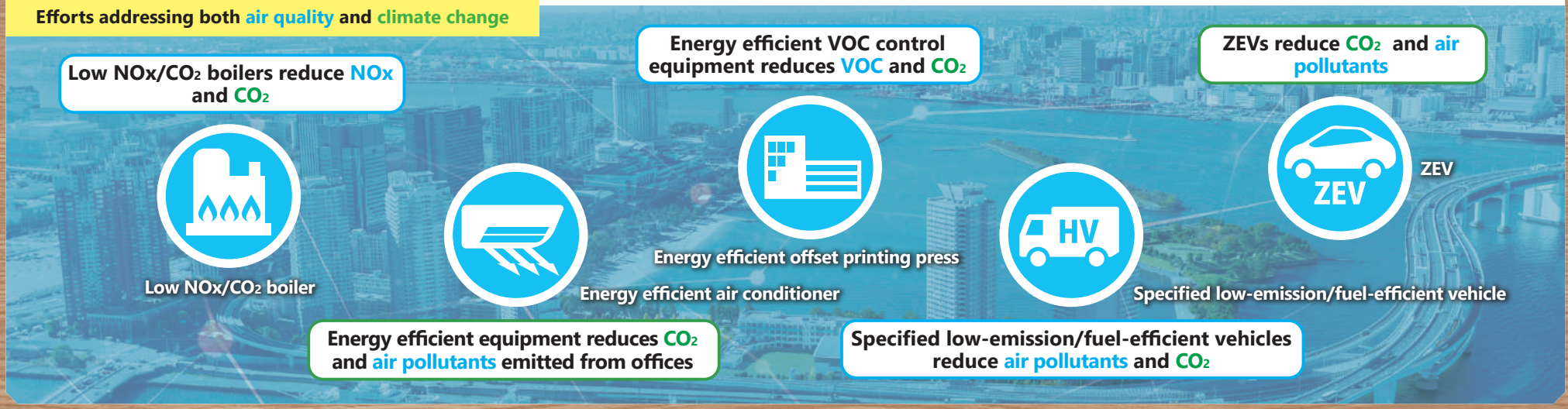
■ CO_2 emissions in the transport sector of Tokyo



Efforts for good air quality addressing climate change as well as improving air quality

- TMG has promoted a variety of measures for air pollution, including additional regulations for factories and diesel vehicle control. Ozone, the main component of photochemical oxidants, and soot in PM2.5 are air pollutants but they also have a greenhouse effect. Therefore, reducing them is also effective in combating climate change. To promote measures for air pollution and those for CO_2 simultaneously, TMG is implementing initiatives that incorporate CO_2 reduction perspectives, such as the certification system for low-NOx boilers and the program of the mandatory introduction of low-emission vehicles.
- Switching to energy efficient equipment with high combustion efficiency also curbs the emission of air pollutants. As ZEVs do not emit exhaust gases during driving, they do not produce CO_2 or air pollutants either. These efforts promoted as part of climate change measures are also effective in improving air quality.

Efforts addressing both air quality and climate change



Policy 6 Measures for Fluorocarbons

Necessity of measures for Fluorocarbons

- Refrigerants in air conditioners and refrigeration/freezing equipment have been switched from ozone-depleting fluorocarbons to hydrofluorocarbons that are calculated as greenhouse gases, with fluorocarbons now accounting for 10% of the greenhouse gases in Tokyo.
- Though fluorocarbons have a global warming potential several dozen to over 10,000 times greater than CO_2, their impact can be mitigated more quickly as they remain in the atmosphere for a shorter period of time. Therefore, early action is highly effective.

Current status of measures for fluorocarbons

- Approximately 70% of fluorocarbon emissions come from leaks in commercial equipment, primarily due to poor maintenance during use and failure to recover fluorocarbons at the time of disposal.
- TMG is working to reduce these leaks by promoting the adoption of non-fluorocarbon equipment and conducting on-site guidance for equipment managers and inspections at demolition sites by certified fluorocarbon inspectors.
- Home air conditioners account for more than 20% of fluorocarbon emissions. TMG is raising public awareness to promote proper disposal; however, approximately 40% are still discarded through channels not covered by the Home Appliance Recycling Law, highlighting the need for stronger measures.
- As a result of these ongoing efforts, fluorocarbon emissions in Tokyo have remained relatively stable in recent years.

Trends in measures for fluorocarbons

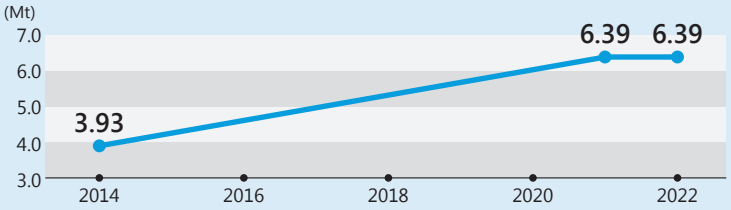
Efforts to reduce fluorocarbons have been strengthened globally through international agreements that mandate restrictions on their production

- Countries are required to gradually reduce fluorocarbon production by 85% by 2036.
- The national government has revised the Act on Rational Use and Proper Management of Fluorocarbons to strengthen regulations on refrigerants used and crackdown on disposal.

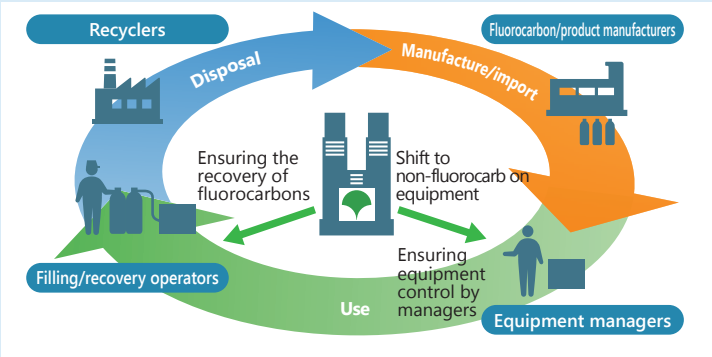
Development and introduction of non-fluorocarbon technologies underway

- Commercial refrigeration/freezing equipment with non-fluorocarbon refrigerants, such as CO_2 and propane gas, has seen limited adoption due to high commercialization and installation costs. However, the development of large-scale commercial air conditioning systems is now beginning to make progress.
- Retrofit technologies that allow existing equipment to be adapted for use with non-fluorocarbon refrigerants are beginning to be introduced.

Trends in fluorocarbon emissions of Tokyo in CO_2 equivalent



Roles of TMG at each stage of fluorocarbon life cycle



Trends in the development of non-fluorocarbon equipment

	Refrigeration/freezing equipment	Air conditioners
Residential	Widely adopted	Developed
Commercial	Commercialized/ introduced (with cost issues)	Development of large A/C beginning to progress

	2022 results	2030 targets	2035 targets	2050 visions
Fluorocarbon emissions compared to 2014	62.6% increase (6.39 Mt-CO_2)	65% reduction (1.38 Mt-CO_2)	**70% reduction** (1.18 Mt-CO_2)	▶ **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

Direction for Intensified Action

- Encourage the **development and mass production of non-fluorocarbon products by stimulating demand** for such products through subsidizing the introduction of non-fluorocarbon equipment and promoting the deployment of advanced technologies
- Accelerate efforts to **completely prevent leakage during use and disposal** by expanding the use of AI-based remote monitoring technology and improving the technical capabilities of filling and recovery operators
- Promote **proper recovery and disposal in the residential sector** by deepening understanding among Tokyo residents and businesses through effective public relations in collaboration with related organizations

Major Efforts

Strengthening measures for commercial equipment at each stage

Accelerating the introduction of non-fluorocarbon equipment

- Actively promote the transition to non-fluorocarbon equipment by providing subsidies not only for installation costs but also for the removal of existing equipment
- Support the early deployment of emerging technologies, such as retrofitting or converting large air conditioning systems to non-fluorocarbon models, by monitoring technological advancements and collaborating with industry organizations

■ Energy efficient non-fluorocarbon refrigerator/freezer showcase



Using AI and other emerging technologies to minimize leakage during the use of equipment with fluorocarbons

- Promote corporate efforts to prevent fluorocarbon leakage by leveraging AI and other technologies to automatically identify equipment at high risk and provide targeted on-site guidance
- Encourage the early detection of and response to leaks by subsidizing the introduction of remote monitoring technology using AI and similar tools, while also promoting their benefits through case studies and seminars

Ensuring the recovery of fluorocarbons during disposal by improving technical capabilities

- Increase fluorocarbon recovery by offering on-site guidance and seminars for metal scrap yards and filling and recovery operators
- Encourage industry-wide improvement by establishing a system to evaluate the technical capabilities of filling and recovery operators, fostering an environment where high-performing businesses are recognized and chosen

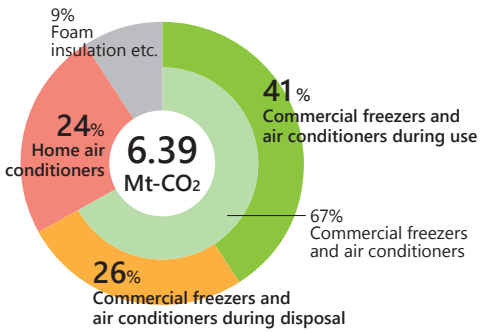
Strengthening measures for home air conditioners targeted at Tokyo residents and businesses

- Build public momentum by participating in municipal environmental events to directly engage with Tokyo residents on the importance of fluorocarbon reduction measures
- Encourage proper disposal under the Home Appliance Recycling Law and the replacement of outdated air conditioners through awareness videos and other educational materials
- Assess current practices around equipment disposal and explore policies to ensure proper collection and disposal, in collaboration with industry organizations

■ Awareness-raising for households



■ Breakdown of fluorocarbon emissions in Tokyo



Major efforts toward zero fluorocarbon emissions by 2050

		–2035	–2050
For businesses	Expanding support for the introduction of non-fluorocarbon equipment for its widespread adoption		All large equipment having non-fluorocarbon refrigerants with fluorocarbon stock in the city significantly reduced
	Promoting the early deployment of retrofits	Progress in the shift to non-fluorocarbon refrigerants	
	Starting support for the introduction of remote monitoring technology	Widespread adoption of remote monitoring technology	Preventing leakage undetectable by the human eye
	Starting on-site guidance using AI and other technologies	Continuing targeted on-site guidance	Significant reduction in the oversight rate of equipment managers
	Introducing a technical competency system for recovery operators	System established with improvements in their technical competencies	Significant improvements in the recovery rate of recovery operators
For households	Raising awareness among Tokyo residents and businesses Identifying current practices for equipment disposal	Promoting measures for the proper collection and disposal of equipment with fluorocarbons	No improper disposal of equipment with fluorocarbons

Policy 7 Promoting Climate Change Adaptation Measures

Necessity of promoting climate change adaptation measures

- It is essential to promote both mitigation measures, which reduce CO_2 emissions from human activities, and adaptation measures, which address the impacts that remain unavoidable despite the fullest possible implementation of mitigation measures.
- City level adaptation measures not only protect lives but also support sustainable economic and social development.

Current status of promoting climate change adaptation measures

- TMG has established the Tokyo Climate Change Adaptation Center in the Tokyo Metropolitan Research Institute for Environmental Protection to collect information on climate change, provide information to municipalities, and raise awareness among Tokyo residents.
- As part of the TOKYO Resilience Project, we are working to build the world's most resilient city by enhancing measures against increasingly severe floods and storms driven by climate change.
- We have strengthened heat stroke prevention measures, such as the introduction of the Special Heat Stroke Alert and the establishment of cooling shelters, through amendments to the Climate Change Adaptation Act.

Worsening impacts of climate change

- The number of people transported by ambulance due to heat stroke in the jurisdiction of the Tokyo Fire Department from June to September 2024 was 7,993 (preliminary), the highest in the past five years.
- In Tokyo, the frequency of rainfall exceeding 50 mm per hour has been on the rise, leading to increased flooding and damage to residential areas.
- The conditions affecting agriculture, forestry, and fisheries are deteriorating, with notable changes in cultivation environments and marine ecosystems.

■ **Mitigation and adaptation measures**



Source: A-PLAT

■ **2024 Oku-Noto Heavy Rains**



Source: Website of Ishikawa Prefecture

■ **Deterioration of crop quality due to high temperatures**



Broccoli　Japanese radish

Image provided by the Tokyo Development Foundation for Agriculture, Forestry, and Fisheries

	2024 results	2030 targets	2035 targets	2050 visions
Decisively promoting adaptation measures under the Tokyo Climate Change Adaptation Plan		Efforts that take into account the future impacts of climate change, while incorporating perspectives such as digital transformation, are being implemented across all affected sectors.	In all areas, including heat stroke prevention, initiatives to minimize the risks of climate change are progressing.	▶ **Minimize risks from climate change impacts** ● Realize a city that protects the lives and property of Tokyo residents while continuing to attract people and businesses
Main targets* Number of cooling shelters installed	1,525	2,600	3,000	

* See the Tokyo 2050 Strategy for other targets.

Direction for Intensified Action

■ In addition to **measures to protect the lives of Tokyo residents** from extreme heat, TMG will **strengthen adaptation measures from a medium- to long-term perspective**. This includes comprehensive efforts to **prepare for increasingly frequent and intense storms and flooding**, as well as **promoting agriculture, forestry, and fisheries** that are resilient to climate change

Major Efforts

Promoting adaptation measures in fields affected by climate change

Natural disasters: Measures for more intensified storms and flooding

- Strengthening preparations in both structural and non-structural aspects

✓ Strengthening the maintenance of regulating reservoirs, seawalls, and other infrastructure in preparation for increased rainfall and rising sea levels

✓ Identifying and reducing risks through cutting-edge technology, such as using AI to facilitate the operation of floodgates

■ Regulating Reservoir under Kanda River/Loop Road No. 7



Health: Measures against heat stroke and heat island effects to protect lives

- Promoting initiatives to minimize the impact of rising temperatures on health

✓ Comprehensive information dissemination to support heat stroke prevention measures PJ

✓ Measures against heat stroke at educational, construction, and other sites PJ

✓ Measures against heat island effects, including heat blocking pavement on roads

✓ Widespread adoption of heat-resistant buildings, such as houses with thermal insulation PJ

■ A poster outlining heat stroke prevention measures



Agriculture, forestry, and fisheries: Sustainable agriculture, forestry, and fisheries

- Promoting agriculture, forestry, and fisheries that are resilient to climate change

✓ Creating a supportive working environment for farmers by subsidizing the installation of environmentally controlled greenhouses and related facilities

✓ Promoting the cyclical use of forests to enhance resilience against disasters

✓ Advancing research on climate-resilient and sustainable agriculture practices

✓ Restoring seaweed beds affected by shifts in the Kuroshio Current and other environmental changes

■ Development of forests resistant to disasters



Water resources and the water environment: Relevant conservation

- Reducing the risks posed by severe droughts and deterioration of raw water quality as much as possible to ensure stable supply of high-quality tap water
- Creating a comfortable water environment by improving the combined sewer system

✓ Proper management and conservation of water conservation forests

✓ Promoting advanced and semi-advanced sewage treatment

■ Water conservation forests around Ogochi Dam



Natural environment: Relevant conservation

- Minimizing impacts on biodiversity
- Enhancing efforts to utilize and restore the functions of the natural environment

✓ Specifying additional conservation areas to protect biodiversity

✓ Promoting urban greening to create greenery

✓ Building additional green infrastructure that leverages the functions of greenery and nature

■ Example of building green infrastructure



Encouraging efforts made by municipalities, Tokyo residents, and businesses through the Local Climate Change Adaptation Center

- Analyzing climate change impacts and adaptation measures both at home and abroad, providing recommendations to municipalities, and improving public awareness among Tokyo residents

✓ Publishing a map of cooling shelters and other facilities throughout Tokyo

✓ Disseminating information on climate change adaptation through videos and other media

Priority Project

Preparing for a Hotter Future - Aiming to Be a City Resilient to the Heat

■ In order to protect the lives of Tokyo residents, TMG will **urgently promote citywide measures against heat stroke** and **further strengthen resilience to extreme heat**.

Multifaceted dissemination of heat stroke prevention information - Utilizing diverse approaches tailored to different age groups, industries, and other target-specific characteristics

From April: Preparing for summer

- Heat acclimatization
  - Appropriate exercise and bathing before summer will help your body acclimatize to the heat
- Maintenance of air conditioners
  - Proper cleaning improves cooling efficiency
  - Importance of test runs and regular cleaning before summer
- Green curtains
  - Effect of suppressing room temperature rise

■ Portal site of measures against heat stroke



■ Flier

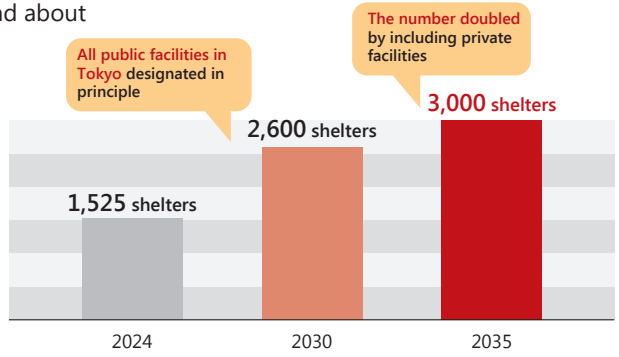


From June: Preparing for rising temperatures

Public awareness campaign to promote the use of cooling shelters and encourage the use of air conditioners

NEW! Heat-related targets

In collaboration with municipalities, cooling shelters will be set up across Tokyo to provide accessible relief while you are out and about



From mid-July: Preparing for extreme heat

Calling attention to heat stroke at water sprinkling events etc.

Publishing the locations of cooling shelters and TOKYO Cool Share Spots on the Tokyo Disaster Preparedness Map

■ Cooling shelter logo



Adoption of knowledge about measures against heat stroke

TOKYO Zero Heat Stroke Action Project in collaboration with the Japan Weather Association

Dispatching qualified and experienced experts to municipal events and other occasions to encourage action among Tokyo residents



Protecting workers from the heat

Dispatching advisors to give recommendations to essential workers on on-site measures and providing support for the formulation of guidelines



Synergy effect of insulation and greenery

Keep your home cool at all times with insulation!

× Insulation

東京ゼロエミ住宅

Approximately 90% of deaths from heat stroke occur indoors. Combining well-insulated homes with renewable energy and storage batteries enables the use of air conditioners with stored electricity even during power outages, offering significant benefits for both health and disaster resilience.

Cool the city with greenery and water!

× Greenery



Roadside trees

Greenery helps lower temperatures. TMG will promote the development of parks, green spaces, and roadside trees, as well as the conservation and management of agricultural lands, to incorporate small-scale greenery throughout Tokyo, cooling down the city.

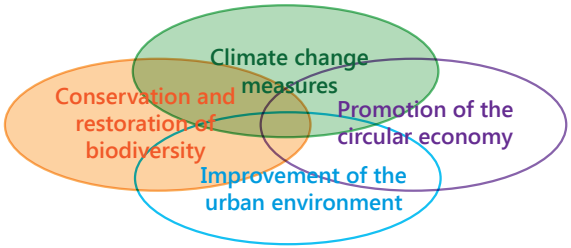
Topic

How Do We Confront Climate Change and the Biodiversity Crisis to Protect the Future?

Climate change and biodiversity are closely related. What are their interactions?

- With more than 46,000 species of living things at risk of extinction*, climate change is expected to further worsen biodiversity loss. Biodiversity supports both climate change mitigation and adaptation by enabling CO_2 absorption through plant photosynthesis and helping to prevent soil erosion and preserve water resources.
- As initiatives for climate change and biodiversity affect each other, it is extremely important to promote actions that contribute to solving both issues, taking into account their synergies and trade-offs.

* IUCN Red List in 2024



Addressing biodiversity and climate change simultaneously through efforts for realizing nature positive*

*Nature positive refers to halting biodiversity loss and putting it on a path to recovery.

Cyclical use and regeneration of forests

TMG's main initiatives:

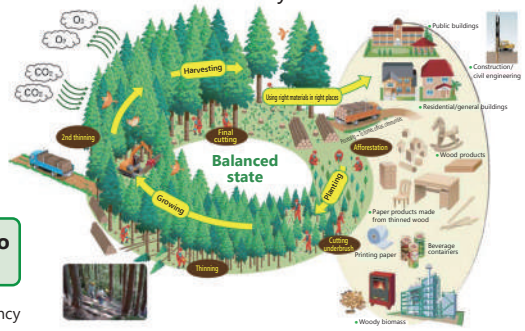
- Promoting the cyclical use of forests
- Encouraging the use of locally-sourced Tama-area timber in public and private facilities
- Advancing reforestation efforts in the Tama area

Forest sinks contribute to CO_2 reduction

Source: Website of the Forestry Agency

Scheme of the cyclical use of forests

A cycle of planting, growing, cutting, and using wood to maintain healthy forests

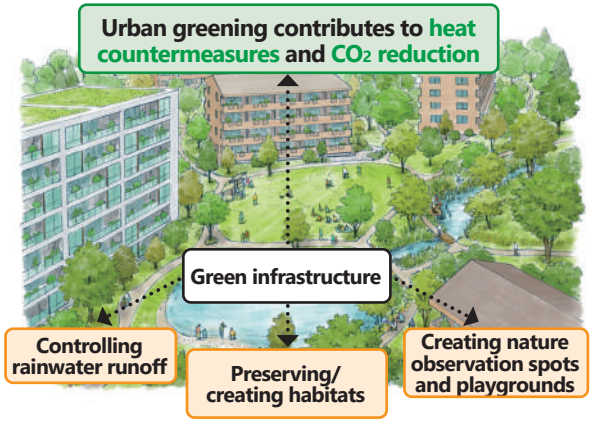


Green infrastructure in urban areas

TMG's main initiatives:

- Construction of rainwater storage/drainage facilities and rain gardens, and dissemination of information on initiatives
- Promoting three-dimensional greening on rooftops and exteriors

Source: "Green Infrastructure Practice Guide," the Ministry of Land, Infrastructure, Transport and Tourism



Establishing ecologically symbiotic waterfronts

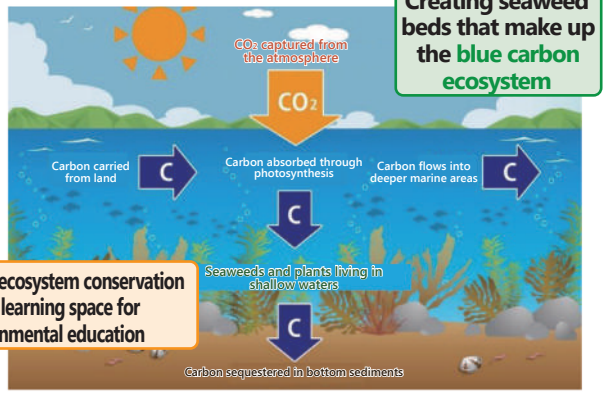
TMG's main initiatives:

- Creating a healthy marine environment by promoting blue carbon* ecosystems and using seaweed beds as a learning place for environmental education

*CO_2 captured in marine ecosystems through photosynthesis and sequestered in seabed sediments or the deep ocean

Source: Activity Policy for Creating Seaweed Beds in the Port of Tokyo

Creating seaweed beds that make up the blue carbon ecosystem



A place for ecosystem conservation and a learning space for environmental education

Tokyo Green Biz, a green project looking 100 years into the future

Realizing a sustainable city in harmony with nature

Direction of policies toward 2035:

- Handing down existing greenery, including agricultural lands and woodlands, to the future for the conservation and restoration of biodiversity
- Promoting the maintenance of parks and three-dimensional greening and utilizing the diverse functions of greenery to address social issues



Policy 8 TMG's Initiatives for Its Own Sustainability

Necessity of TMG's initiatives for its own sustainability

- TMG is a business that consumes a lot of energy and resources, accounting for more than 3% of the total greenhouse gas emissions in Tokyo.
- With "Let's Start from Here" in mind, TMG has to further strengthen its initiatives to reduce greenhouse gas emissions and encourage the efforts of Tokyo residents and businesses.

Progress of major policies with 2023 results/preliminaries:

- Under the Zero Emission TMG Action Plan from FY 2020 to 2024, TMG has taken decisive steps to reduce greenhouse gas emissions by installing solar power generation equipment across the governor's bureaus/departments, and by leading the transition to non-gasoline vehicles.
  - ✓Greenhouse gas emissions from TMG (governor's bureaus/departments) reduced by 33% compared to FY 2000 levels
  - ✓Total installed capacity of solar power generation equipment at TMG facilities (governor's bureaus/departments) amounted to 13.367 MW
  - ✓Replacement of TMG-owned vehicles (passenger cars) with non-gasoline counterparts reached 93% excluding special-purpose vehicles

■ **Solar power generation equipment installed at the Chubu Comprehensive Center for Mental Health and Welfare**



■ **TMG-owned ZEV vehicle with solar power generation equipment**



Actions toward 2035

Accelerating action across TMG including public enterprises to decisively lead efforts toward decarbonization throughout Tokyo

- Under the revised Zero Emission TMG Action Plan from FY 2025 to 2030, TMG will set a higher target than "Carbon Half" to promote decarbonization actions throughout TMG.

For more information:

Zero Emission TMG Action Plan in March 2025

Taking the initiative based on the Zero Emission TMG Action Plan

Main targets in the plan

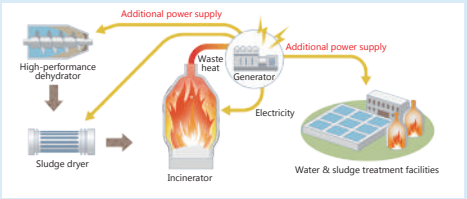
See page 69 for other targets.

TMG's new targets for FY 2030	Greenhouse gas emissions compared to FY 2000	Percentage of power generated by renewable energy	Installed solar power capacity	TMG-owned vehicles	Calculated fluorocarbon leakage compared to FY 2015
	55% reduction	**65% or more** **100% at governor's bureaus/departments**	**74 MW** + **Approx. 10 MW of next-generation solar cells etc. by 2035**	**Passenger cars** **All cars to be ZEVs** Excluding special-purpose vehicles	**65% reduction**

Specific initiatives at TMG facilities

- Expand the introduction of solar power generation equipment by promoting the installation of next-generation solar cells and the use of exteriors and other surfaces for installation
- Promote decarbonization of the sewerage service by, for example, introducing energy-supplying (carbon minus) incinerators
- Accelerate the installation of chargers and replacement of TMG-owned vehicles with ZEVs
- Encourage a shift to non-fluorocarbon equipment by utilizing information from the refrigerant management system

■ **Scheme of an energy-supplying incinerator**



Policy 9 Collaborating with All Entities

Necessity for collaborating with all entities

- A powerful societal transformation can be driven by harnessing the collective strength of many individuals and companies concentrated in Tokyo, working together toward a common goal.
- As the climate crisis is a global challenge, it is essential for cities in Japan and around the world to join forces and collaborate across regions.

Progress of major policies:

- Collaboration with advanced companies and other organizations
  - ✓ Team Mottainai (collaboration with companies, organizations, and individuals working on the initiative)
  - ✓ Collaborative council to promote the expanded use of chargers at condominiums (collaboration with charging businesses and other organizations)
- Hosting of overseas visitors in FY 2023: 175 visitors in 17 delegations
  Dispatch of officials overseas in FY 2023: 34 officials on 10 missions

Actions toward 2035

Accelerating social change by establishing individual practice and connections with various actors through decarbonization actions

- Developing initiatives aimed at behavioral change in collaboration with Tokyo residents, companies, and organizations
  - ✓ Promote a shift to consistent decarbonization actions through engagement, such as encouraging thermal insulation retrofits in collaboration with industry organizations
  - ✓ Encourage the social implementation of cutting edge technologies, subsidizing the use of startups and utilizing the knowledge and ideas of universities
- Enhancing initiatives for future generations
  - ✓ Through hands-on courses and learning facilities, TMG will cultivate the next generation of individuals empowered to take independent action toward achieving a decarbonized society

■ Regular meetings with universities



■ Environmental learning





- Promoting effective initiatives through collaboration in the Tokyo metropolitan area and at the national level

■ Collaboration with other local governments



  - ✓ Share TMG's experiences, such as the mandatory installation of solar power generation equipment, with other prefectures and work together to address common challenges
  - ✓ Build a cooperative framework with local governments outside Tokyo, including the use of Green Hydrogen produced in other prefectures

■ Research at the Tokyo Metropolitan Research Institute for Environmental Protection



- Social change through engagement with policy collaboration organizations
  - ✓ Promote behavioral change among Tokyo residents by providing support and information via Cool Net Tokyo and T-CEC
  - ✓ Utilize research results from the Tokyo Metropolitan Research Institute for Environmental Protection and other organizations to address social issues

Further promoting collaboration with overseas cities to address global environmental issues (2035 target)

- Active approaches and contribution to the international community
  - ✓ Improve policies through the mutual learning with overseas cities to address common issues by actively participating in international networks such as C40 and ICLEI

■ Mutual learning with ICLEI member municipalities



- Improving international presence
  - ✓ Demonstrate leadership in addressing issues by participating in COP and other international conferences, hosting international meetings, and developing overseas public relations

■ Cities calling for global climate action at COP29



Policy 9 Collaborating with All Entities - Strengthening Cooperation with Municipalities

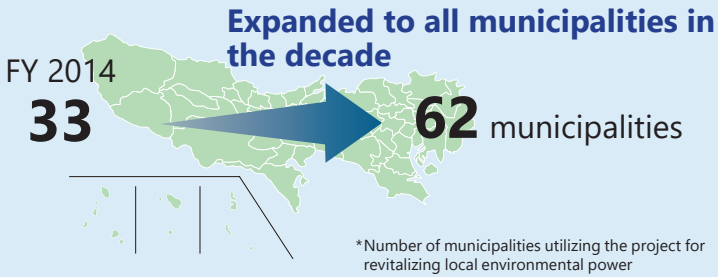
Necessity of strengthening cooperation with municipalities

- Municipalities that are familiar with local circumstances and have resources specific to their regions are important partners in decarbonization.
- Momentum for decarbonization is building, 48 municipalities (as of the end of December 2024) in Tokyo have declared themselves Zero Carbon Cities, aiming for net zero CO_2 emissions by 2050.

Progress of major policies:

- The municipality subsidy program was renewed in FY 2024, taking into account the needs of local governments. A mechanism to subsidize creative and innovative initiatives with potential impact was added alongside the renewal.
  For example, Oshima Town, chosen for a promising and innovative project, has installed cylindrical solar panels to study the potential for sharing solar power on remote islands.
- TMG is promoting technical collaboration and support, including joint examination of initiatives in the resource management field and the sharing of know-how of climate change measures.
- With the aid of municipalities, TMG has been implementing the Project to Promote the Group Buying of Solar Power Generation Equipment and Storage Batteries to realize price reductions through economies of scale.

Increasing number of municipalities working on decarbonization together with TMG



*Number of municipalities utilizing the project for revitalizing local environmental power

Examples of technical support

■ **Seminar for municipal officials on adaptation measures**



Joint projects

■ **Recruiting prospective purchasers with the aid of municipalities**



Actions toward 2035

Building stronger partnerships with municipalities to decisively promote decarbonization as an all-Tokyo effort

Promoting efforts toward decarbonization according to local characteristics

- Lead Tokyo's decarbonization efforts by providing targeted support tailored to municipalities based on their local contexts, including financial support for those implementing local decarbonization initiatives
- Further strengthen engagement with municipalities by expanding technical support and collaboration, serve as a central hub to foster inter-municipal partnerships, and encourage sustainable practices among residents, companies, and organizations
- As an all-Tokyo effort, TMG aims to increase the amount of waste cooking oil collected for producing SAF and the number of cooling shelters installed in cooperation with municipalities

Zero emission district development project

- Provide subsidies to help municipalities decarbonize, foster cooperation among them, and establish zero-emission districts in Tokyo
- Promote decarbonization tailored to the regional characteristics of municipalities, while taking advantage of Tokyo's abundant potential, such as the use of advanced AI technology and next-generation solar cells along with an accumulation of startups

■ **Schematic of zero emission districts**



Policy 10 Building the Foundation for Realizing a Zero Emission Tokyo (Finance etc.)

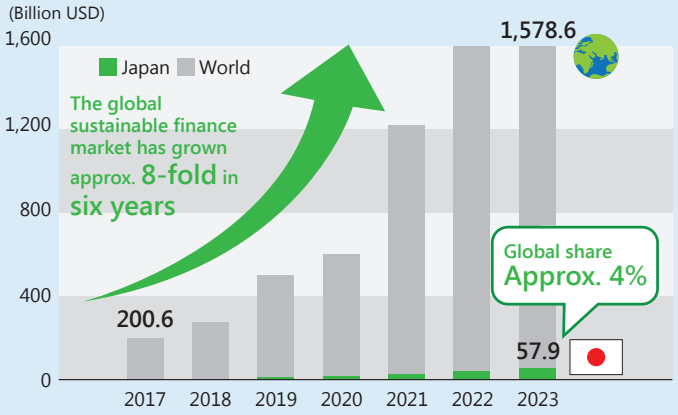
Necessity of building the foundation

- Sustainable finance, as a foundation for supporting sustainable economic and social systems, is gaining global importance and experiencing rapid market growth. However, Japan currently accounts for only about 4% of the global market share.
- In order to accelerate green transformation, it is essential to enhance the development of green transformation-related startups, encourage investment, and deploy new technologies early.

Progress of major policies:

- TMG started issuing green bonds ahead of other local governments in Japan. Since FY 2024, we have contributed to revitalizing the domestic sustainable finance market by upgrading the bonds to Tokyo Green and Blue Bonds through the addition of projects that support the conservation of the marine environment. Also in FY 2024, we issued new foreign bonds, the Tokyo Sustainability Bonds, in overseas markets.
- In March 2024, the public-private partnership Energy Creation and Storage Promotion Fund was established. TMG has invested two billion yen to support the establishment of a financing model for the grid storage battery business that contributes to the expansion of renewable energy.

Trends in the sustainable finance market



Source: "Green Finance Portal," the Ministry of the Environment
The global values are the total of the issuance of green bonds, sustainability bonds, sustainability-linked bonds, green loans, and sustainability-linked loans. Exchange rate: 1 USD = 100 JPY

Actions toward 2035

Targets:

- **Encouraging sustainable practices within companies Decarbonization management accelerates CO_2 reduction in the commercial sector, increases circulation of green products in the market, and drives sustainable choices among consumers**
- **The share of sustainable investment balance held by Japanese institutional investors etc. (percentage in the world): At least 15% compared to 14.1% in FY 2022**

Developing green transformation startups

- Establish a public-private partnership Green Transformation Innovation Promotion Support Fund (tentative name) for startups contributing to the development and adoption of next-generation energy in order to promote the creation of capital flows that will help address social issues
- Provide intensive support for the entry of foreign companies with high technological capabilities in green transformation-related fields in order to accelerate green transformation through the creation of innovation and expansion of the market in collaboration with companies in Tokyo
- Expand the excellent green transformation technologies of Tokyo's small and medium-sized businesses and startups in the Global South, contributing to global decarbonization and supporting corporate growth

Promoting SDGs investment

- Accelerate the implementation of TMG's environmental policies by issuing the Tokyo Green and Blue Bonds, encouraging investment from Tokyo residents and businesses
- Issue new Tokyo Resilience Bonds in overseas markets to fund initiatives addressing increasingly severe floods and storms caused by global warming
- Foster momentum for sustainable finance through the Tokyo Sustainable Finance Week, featuring a concentrated series of seminars and events

Promoting the deployment of new technologies with an eye on the entire supply chain

- Support the widespread adoption of environmentally friendly products by promoting environment-conscious green procurement of goods, services, and construction materials
- Encourage corporate efforts that contribute to decarbonization throughout the supply chain, including Scope 3, by utilizing programs and funds
- Foster momentum for green products to be chosen throughout society by supporting the development, production, branding, and promotion of green products

Priority Project

Developing the Next Generation of Leaders to Drive a Decarbonized Future

■ TMG will **cultivate future leaders** capable of practicing **sustainable behaviors across diverse fields** such as resource use and nature conservation, **enhancing the impact of individual actions and choices**. We will also **foster industrial talent to serve as a driving force** for realizing a decarbonized society, while expanding the network of green transformation.

Environmental education to develop human resources that support a decarbonized society

Comprehensive environmental education programs tailored to life stages

Promotion of Carbon Half-style education for elementary school, junior high school, and high school teachers

Conducts lessons that foster the ability to take action toward decarbonization by raising awareness in schools through the Carbon Half-Style Promotion Education Forum and related Carbon Half-style materials

Environmental education workshops for elementary school and junior high school teachers and university students in teacher training courses

Hold hands-on classes that introduce examples of practical environmental learning programs aligned with standard school subjects



Classes on demand for 9-12 year olds

Featuring topics such as food waste and hydrogen energy, these classes aim to cultivate future leaders who can take action toward building a sustainable society

Participatory program to learn about Tokyo's diverse nature for elementary school students

Provides an opportunity to learn about biodiversity conservation in the natural environment

Tokyo Green Campus Program for elementary school, junior high school, high school, and university students

Conducts a nature experience program linked to school subjects to develop the next generation of individuals who will take the lead in conservation activities

Environmental learning courses by subject for Tokyo residents for all generations, including adults

Provide an opportunity to learn and think about the environment, featuring topics from a variety of fields, such as energy, biodiversity, and sustainable resource management

Providing information on opportunities for lifestyle changes

TOKYO-ecosteps

TOKYO ecosteps

A membership program that provides the latest, cross-sectoral, and easy-to-understand information on environmental learning facilities and environmental events in Tokyo, encouraging lifestyle changes among Tokyo residents

Tokyo Climate Change Adaptation Center



Creates and publishes supplementary learning materials, including videos and documents, which can be used in school classes

Tokyo Metropolitan Research Institute for Environmental Protection



Holds public events to disseminate research results on air and water quality, plastics, etc. in Tokyo to elementary school students and their local communities

Environmental learning facilities

Central Breakwater Landfill Site



Landfill site



Environmental learning hall

- Offers hands-on learning opportunities focused on resource management, including waste treatment and the 3Rs
- Features an environmental learning hall where visitors can explore waste-related topics through sound and video

Hydrogen information center "Tokyo Hydrogen Museum"





- Organizes rotating exhibitions and hands-on events in collaboration with private companies and local governments to effectively showcase the latest trends in the social implementation of hydrogen energy

Developing and supporting skilled industrial professionals who will lead green jobs and contribute to addressing environmental challenges

Climate change

Technical support for designers and constructors of zero emission houses

Provide support for the efforts of local contractors who are working to improve the design and construction techniques for decarbonized houses

Resources

Certification of outstanding industrial waste treatment businesses

Promote the advancement of high-quality treatment providers and support the growth of the recycling industry through certification programs, such as the Industrial Waste Expert scheme

Air quality

Improving the technical competence of filling and recovery operators

Survey the current status of filling and recovery operators to set technical standards, and establish a mechanism in which operators aim to improve their technical capabilities in fluorocarbon recovery

Nature

Preserving and enhancing forestry staff skills

Establish the Tokyo Forestry Labor Securing Support Center to provide comprehensive, integrated support for the development of forestry personnel



04

CHAPTER 04

REALIZING A ZERO EMISSION TOKYO AND THE FUTURE BEYOND THAT

Driving innovation in decarbonization technologies for a sustainable future

To achieve a Zero Emission Tokyo, it is essential to utilize both existing and cutting-edge technologies. This includes enhancing energy efficiency, expanding the use of renewable energy, adopting decarbonized heat sources, advancing electrification where feasible, and fostering innovations in breakthrough technologies with a long-term vision toward 2035 and beyond.

Amid rapid digitalization and technological advancement, companies and other organizations are accelerating investments in next-generation solar cells, offshore wind turbines, Green Hydrogen, and carbon recycling technology—key pillars of industrial competitiveness. Now is the moment to change the landscape and spark a wave of transformative innovation.

Explosive evolution of AI and other technologies

The rapid advancement of generative AI and other digital technologies has raised concerns over increasing energy consumption. At the same time, innovations to accelerate decarbonization are also expected, such as AI-based optimization technology for renewable energy supply and demand, and the development of efficient new materials with high CO_2 reduction potential.

In addition to groundbreaking technologies like photonics-electronics convergence technology and immersion cooling—both of which can dramatically reduce power consumption in data centers (DCs)—entirely new classes of decarbonization technologies are emerging. Recognizing this, the national government has outlined its intention to promote investment in such innovation in its GX2040 Vision.

Tokyo is committed to driving game-changing progress toward the future

The Tokyo 2050 Strategy includes a visionary "Prediction for the 22nd Century," created using generative AI to envision Tokyo 100 years from now. It is important to continuously embrace bold unconventional thinking—unbound by stereotypes—and tackle challenges with a forward-looking mindset.

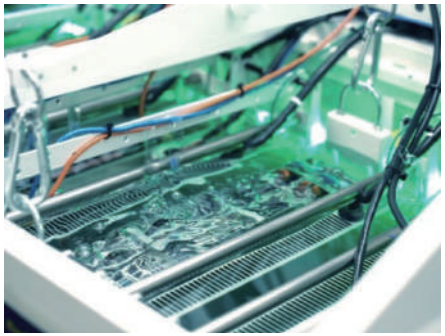
- In collaboration with universities and companies, TMG is advancing the development and research of next-generation technologies such as DAC, which extracts and captures CO_2 directly from the atmosphere. TMG is also working to establish urban carbon recycling business models.
- TMG will promote capital flows that will address social issues by, for example, establishing a Green Transformation Innovation Promotion Support Fund (tentative name) for startups focused on the development and adoption of next-generation energy.
- Through the Tokyo Bay eSG Project, TMG will leverage its land to support the development of cutting-edge renewable energy technologies.
- TMG is also committed to driving innovations through SusHi Tech Tokyo, one of the largest startup conferences in Asia.

■ **Website of the Tokyo Bay eSG Project**



SusHi Tech TOKYO
Sustainable High City Tech Tokyo

■ **Immersion cooling, energy efficiency technology for DCs**



Source: Website of the Agency for Natural Resources and Energy

■ **Prediction for the 22nd Century**



Source: Tokyo 2050 Strategy

For more information:↑

Contributing to achieving the 1.5°C target in cooperation with the national government

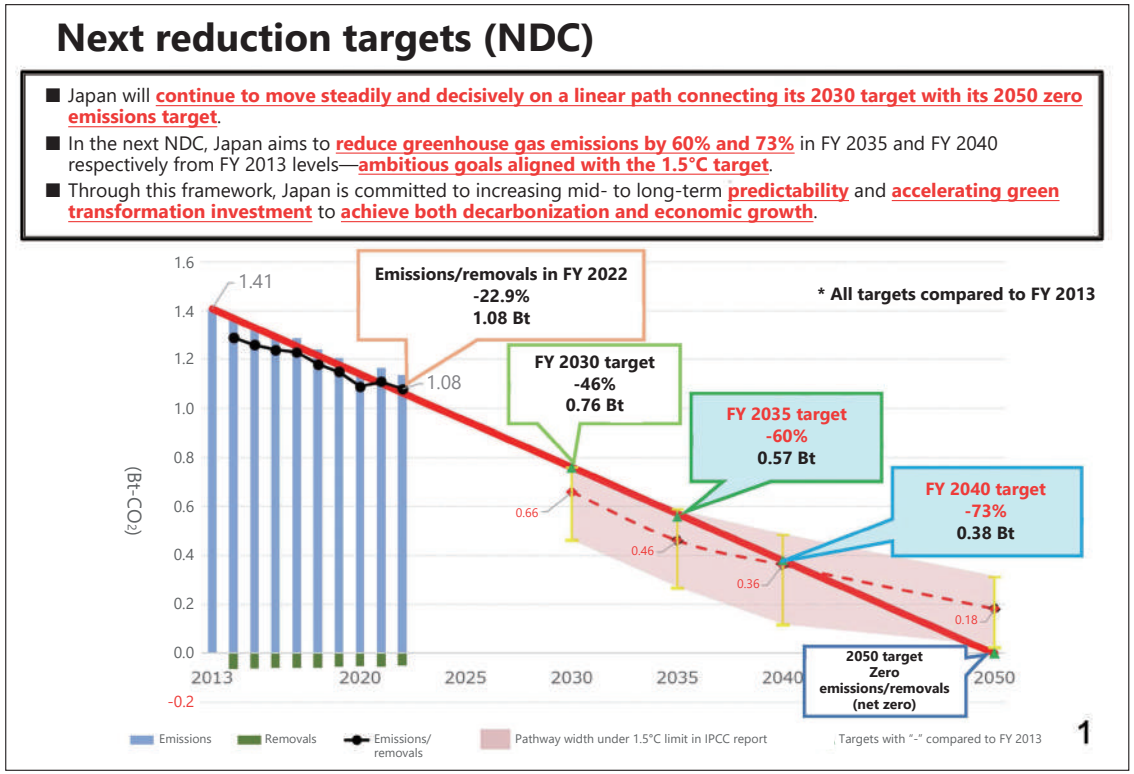
In February 2025, the national government formulated the GX2040 Vision to simultaneously achieve stable energy supply, economic growth, and decarbonization. In addition, the national government formulated the 7th Strategic Energy Plan and the Plan for Global Warming Countermeasures, clarified the power generation mix for 2040 and greenhouse gas reduction targets for 2035 and 2040, and submitted Japan's new NDC (Nationally Determined Contribution) to the United Nations.

As decarbonization and energy security must be achieved in an integrated manner, the role of the national government, which bears a major responsibility for energy supply, is crucial for realizing a 2050 Zero Emission Tokyo.

TMG will continue to urge the national government to develop initiatives that support the independent and proactive efforts of Tokyo and other regions. We will pursue further technological advancements toward 2050, promote concrete and effective efforts, and lead by example in the international community.

To help achieve the internationally shared 1.5°C target and secure a brighter future, we are firmly committed to realizing zero emissions in collaboration with the national government.

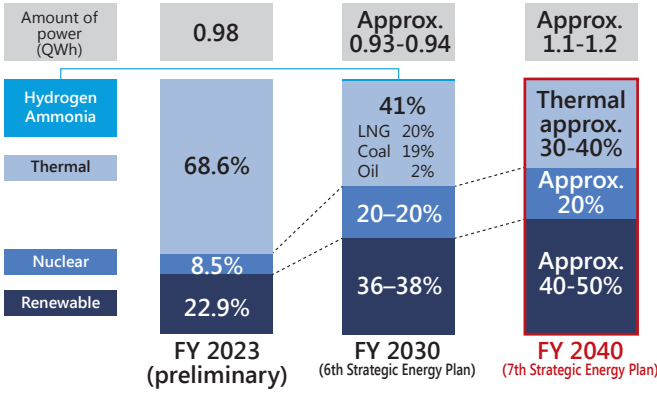
Japan's new NDC



Source: "Outline of Plan for Global Warming Countermeasures" in February 2025, Cabinet Secretariat, Ministry of the Environment, and Ministry of Economy, Trade and Industry

Trends in Japan's power generation mix

The national government aims to make renewable energy the primary power source (approx. 40-50%) by FY 2040



Source: "7th Strategic Energy Plan in 2025" and "6th Strategic Energy Plan in 2021," Agency for Natural Resources and Energy

Ensuring Zero Emissions by 2050 together with future generations

With 25 years remaining until 2050, children and younger generations—who will shape the future—are key to promoting decarbonization actions.

Equally important is fostering changes in the awareness and behavior of adults, inspired through the actions and perspectives of children. TMG has developed engaging content that encourages children to think about environmental issues and take action, while also hosting events that give them opportunities to directly share their opinions with us.

We are also actively listening to diverse voices from the younger generation when designing critical initiatives, such as the program mandating the installation of solar power generation equipment, and in shaping key strategies for the future.

We are committed to ensuring Zero Emissions by 2050 by taking every opportunity to actively communicate with the generations that will take the lead in the future.

Environment Ambassador at Home Project



TMG has been conducting a project in which elementary school children act as environmental leaders at home, engaging in energy-saving and other eco-friendly activities together with their families. An "Environment Ambassador at Home Summit" was also held as a forum for dialogue between children and the governor, where participants shared a variety of ideas.

Discussion with the governor



TMG holds meetings to directly exchange opinions with young people on important issues at TMG. In FY 2024, high school students proposed ideas for a sustainable future to the governor under the theme of Realizing a Zero Emission Tokyo.

Column

Diverse input received in formulating the Tokyo 2050 Strategy



Inviting public input for the formulation of the draft Tokyo 2050 Strategy

We invited public input under the theme "Tokyo in the 2050s on Your Mind." Through this broad public engagement initiative, we received a wide range of opinions, particularly from young people. We also received valuable feedback related to environmental issues.

Children's Workshop

To help think about a better future for Tokyo, we asked children to discuss their ideal Tokyo.

They shared many of their ideas regarding the environment, such as "Tokyo, Japan, and the world should achieve zero carbon dioxide emissions."



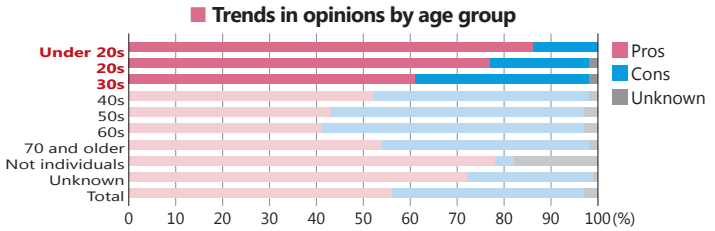


University Students' Workshop

We held discussions with university and graduate students from 17 universities in Tokyo on the theme of what Tokyo should look like in the 2050s. We also received various opinions about the environment.

Public comments on the solar power installation mandate

We received many opinions from the younger generation, many of whom are likely to become homeowners in the future. Notably, strong support came from people in their 20s and 30s, which was a great boost for the implementation of the program.



Source: Results of public comment solicitation for the Revision of the Tokyo Metropolitan Environmental Security Ordinance (Interim Summary)

Discussion with future generations at the Tokyo Metropolitan Environmental Council



We held discussions with youth-led environmental groups on realizing a Zero Emission Tokyo. Participants shared diverse proposals for TMG's environmental policies, emphasizing cross-sectoral collaboration, lifestyle changes, and collaboration with the media.

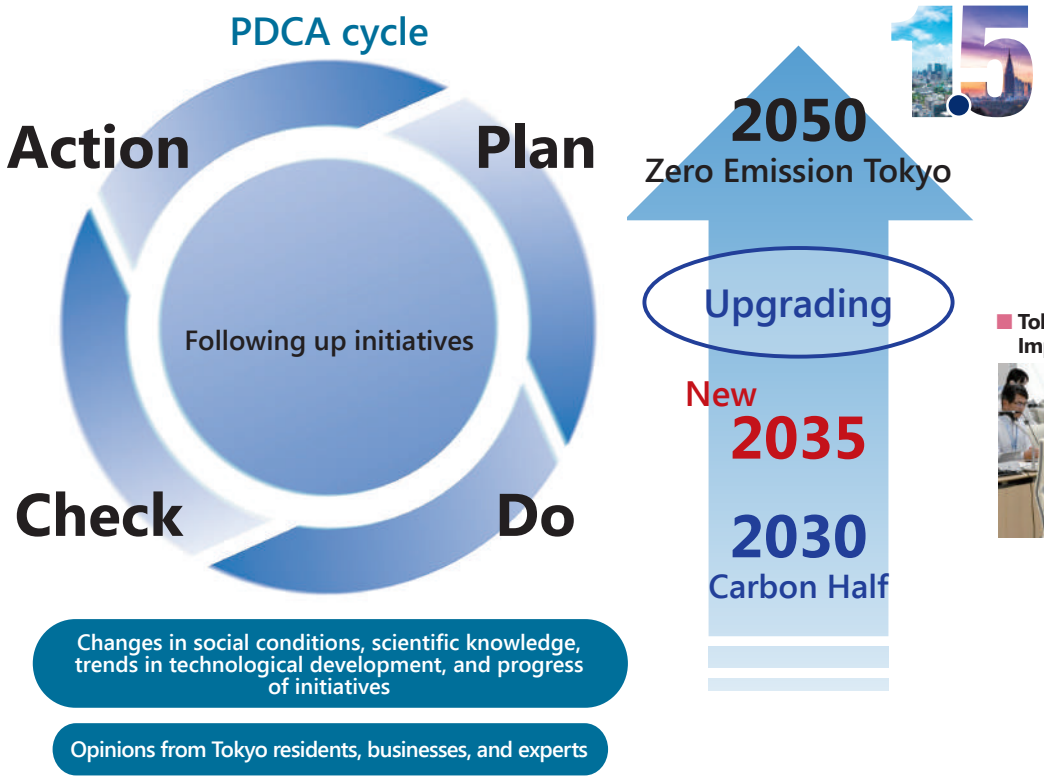
Conducting the PDCA cycle from a variety of perspectives to upgrade initiatives

Now that changes in social structure are accelerating, in order to continue to develop effective initiatives with a sense of urgency, we need to upgrade our perspectives in light of changes in social conditions and scientific knowledge as well as the latest trends in technological development.

As part of an expert advisory network supporting TMG's initiatives, the Tokyo Renewable Energy Implementation Expert Board, the Tokyo Energy Issues Advisory Board established in FY 2023, and the Fluorocarbon Countermeasures Examination Committee established in FY 2024 provide us with recommendations based on knowledge of the latest domestic and international trends.

In FY 2024, the Tokyo Metropolitan Environmental Council held discussions from a wide range of perspectives on important topics in the zero emission field, such as energy efficiency and renewable energy, sustainable resource management, measures for fluorocarbons, ZEVs, and hydrogen, for the purpose of strengthening our initiatives toward Carbon Half and beyond. These perspectives have been reflected in budgets and strategies.

We are committed to ensuring the realization of a 2050 Zero Emission Tokyo, welcoming the opinions of a diverse range of entities, including Tokyo residents, businesses, experts, and organizations, to follow up our initiatives and upgrade our targets.



■ Tokyo Metropolitan Environmental Council



■ Tokyo Renewable Energy Implementation Expert Board



Renewable energy

■ Fluorocarbon Countermeasures Examination Committee



Fluorocarbons

■ Tokyo Energy Issues Advisory Board



Electricity supply and demand, hydrogen

List of Targets

31 individual targets set to achieve the 2035 greenhouse gas emissions reduction target

* New targets

Policies	Targets	2030 targets	2035 targets	2050 visions
Policy 1: Making Renewable Energy a Major Energy Source				
	Percentage of power generated by renewable energy	Approx. 50%	**60% or more**	▶ **All energy to be decarbonized** ● A "power-generating future city" where electricity can be generated in every area, will be our reality, supplying fully decarbonized electricity using renewable energy as a major power source *1 2040 target is approx. 2 GW
	Installation of solar power generation equipment	2.0 GW or more	**3.5 GW**	
	Installation of next-generation solar cells (part of above)*	—	**Approx. 1 GW**	
	Installation of offshore wind turbines*	—	**1 GW or more*1**	
	Installation of residential storage batteries*	2.5 GWh	**3.5 GWh**	
	Installation of grid storage batteries (in TEPCO's service area)*	260 MW	**400 MW**	
Policy 2: Expanding Zero Emission Buildings				
	Greenhouse gas emissions compared to 2000	50% reduction	**At least 60% reduction**	▶ **All buildings in Tokyo will be zero emission buildings** ● All buildings will have become zero emission buildings that account for adaptation measures (resilience), such as disaster prevention and heat countermeasures
	Energy consumption compared to 2000	50% reduction	**At least 50% reduction**	
	Number of high efficiency water heaters installed*	Approx. 3.6 million	**Approx. 4.54 million**	
	Households with thermal insulation retrofits*	3.55 million	**3.85 million**	
	SMEs with energy efficient equipment*	5,000	**10,000**	
Policy 3: Promoting Zero Emission Mobility				
	Market share of non-gasoline vehicles in new car sales (passenger cars)	100%	**Maintain 100%**	▶ **Optimized flow of people and products** ▶ **All cars driven in Tokyo will be ZEVs** ▶ **Expanded use of renewable energy, realizing zero emissions from well to wheel*** * A concept that indicates the environmental load generated through the entire process, from the stage of obtaining fuel (well) to the stage of actual driving (wheel)
	Market share of non-gasoline vehicles in new car sales (motorcycles)	35%	**100%**	
	Number of EV buses introduced*	300	**1,300**	
	Number of EV trucks introduced*	35,000	**70,000**	
	Public fast chargers	1,000	**2,000**	
	Chargers at apartment buildings	60,000	**120,000**	
Policy 4: Expanding the Use of Hydrogen Energy				
	Establishing a Green Hydrogen supply system*	Increase in supply from other prefectures in addition to production in Tokyo	**Establishing a supply system at home & abroad**	▶ **Stable supply of inexpensive Green Hydrogen in the wider area of Tokyo through a pipeline network. Green Hydrogen will be utilized in various sectors—including industry and power generation—becoming a widely accessible energy source for Tokyo residents**
	Number of fuel cell commercial vehicles introduced*	Approx. 5,000	**Approx. 10,000**	
	Number of hydrogen stations for commercial vehicles*	Approx. 40	**Approx. 100**	
Policy 5: Shift to a Circular Economy				
	Municipal solid waste recycling rate	37%	**Approx. 40% (guideline*)** *** Discussed by the Tokyo Metropolitan Waste Council**	▶ **Sustainable use of resources established** ● Minimized CO_2 emissions per unit of the amount of resources used and consumed ▶ **Plastic use with net zero CO_2** ● Plastic production and recycling covered by renewable energy ● Switched to biomass causing no land-use change, limited by the growth rate of plants, and with consideration for social and environmental issues, such as competition with food production ▶ **Net zero food waste** ● Maximized efforts to curb food waste and virtually eliminate remaining food waste by converting it into feed and fertilizer
	Incineration of plastic waste from households and large office buildings compared to FY 2017	40% reduction	**50% reduction**	
	Food waste compared to FY 2000	60% reduction * Changed from 50% reduction	**65% reduction**	

* New targets

Policies	Targets	2030 targets	2035 targets	2050 visions
Policy 6: Measures for Fluorocarbons				
	Fluorocarbon emissions compared to 2014	65% reduction (1.38 Mt-CO_2)	**70% reduction (1.18 Mt-CO_2)**	**▶ 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
Policy 7: Promoting Climate Change Adaptation Measures				
	Number of cooling shelters installed*	2,600	**3,000**	**▶ Minimize risks from climate change impacts** ● Realize a city that protects the lives and property of Tokyo residents while continuing to attract people and businesses
	Construction of heat blocking pavement etc. on Tokyo metropolitan roads	Approx. 245 km	**Approx. 270 km**	
	Concentration of particulate matter (PM2.5)	Annual average of 10 μg/m^3 or less over all monitoring stations	**Continuing annual average of 10 μg/m^3 or less over all monitoring stations**	
	Concentration of photochemical oxidants	**Less than 0.07 ppm (fourth-highest daily maximum, averaged across three consecutive years, averaging time unit of eight hours)**		
Policy 8: TMG's Initiatives for Its Own Sustainability				
	Total capacity of solar power generation installed at TMG facilities	74 MW	**+ Approx. 10 MW of next-generation SCs etc.**	—
Policy 9: Collaborating with All Entities				
	Promoting international collaboration*	Under the leadership of TMG, the international community accelerates action to address global environmental issues	**Further promoting collaboration with overseas cities to address global environmental issues**	—
Policy 10: Building the Foundation for Realizing a Zero Emission Tokyo (Finance etc.)				
	Encouraging sustainable practices within companies*	Increasing number of companies working on decarbonization management, obtaining SBT certification, developing green products, and utilizing carbon credits	**Decarbonization management accelerates CO_2 reduction in the commercial sector. Increasing circulation of green products in the market, driving sustainable choices among consumers**	—
	The share of sustainable investment balance held by Japanese institutional investors etc. (percentage in the world)*	15%	**15% or more**	

● TMG's priority targets

Fields	FY 2030 targets	
Field 1: Energy Efficiency & Renewable Energy		
	Greenhouse gas emissions compared to FY 2000	**55% reduction**
	Energy consumption compared to FY 2000	**35% reduction / at least 50% at governor's bureaus/departments**
	Percentage of power generated by renewable energy	**65% or more / 100% at governor's bureaus/departments**
	Total installed capacity of solar power generation equipment	**74 MW + Approx. 10 MW of next-generation SCs* etc. by 2035**
Field 2: Promoting ZEV Introduction		
	TMG-owned vehicles (passenger cars including minicars) excluding special-purpose vehicles	**100%**
	Replacing gasoline motorcycles with non-gasoline models	**100% by 2029**
	Public chargers at TMG facilities	**At least 780 chargers installed in total**

* Abbreviation for solar cells

Fields	FY 2030 targets	
Field 3: Reducing Single-Use Plastics		
	Bottle-to-bottle recycling implemented in all TMG facilities in principle	
	Material recycling routes established at branch facilities	
	Using reusable cups etc. in principle at events hosted by TMG	
Field 4: Reducing Food Waste		
	Recycling of all food loss and waste from restaurants and shops in TMG buildings	
	Minimum disposal of emergency food stockpiled at TMG	
Field 5: Promoting Measures for Fluorocarbons		
	Calculated fluorocarbon leakage compared to FY 2015	**65% reduction**

Zero Emission Tokyo Strategy Beyond Carbon Half

Toward a 2030 Carbon Half and the Future Beyond

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