TOKYO Resilience Project

Aiming for “Safety for the Next 100 Years”

December 2022

TOKYO METROPOLITAN GOVERNMENT

For a Tokyo Where Everyone Can Feel Safe for the Next 100 Years

■ Natural disasters have struck Tokyo many times in the past. Massive floods and storms, earthquakes, volcanic eruptions, or new pandemics could strike at any time, and also occur in combination.

■ On top of this, the situation is becoming increasingly severe. The IPCC Report released in April of this year underlined once again the imminent threat of rising temperatures triggering more frequent and severe floods and storms, and other such disasters.
In addition, although the revised estimate released in May by the Tokyo Metropolitan Government for damage resulting from a major earthquake directly striking the city showed a reduction in damage from the previous estimate, attention was drawn to challenges associated with societal changes. Disasters carry the risk of power outages and communication breakdowns, and are likely to have an enormous impact on the lives of the people of Tokyo.

■ Anticipating a variety of risks and being fully prepared for the worst-case scenario are at the essence of crisis management. To fulfill our mandate to protect the lives and livelihoods of Tokyo residents, the TMG, in collaboration with various entities including the national government, municipalities and communities, must work hand in hand with the police and fire departments, medical institutions, people involved in the operation of evacuation centers, and many others. At the same time, we must do whatever it takes to prevent catastrophic damage from occurring. As in our motto " Always Be Prepared," ceaseless efforts to be prepared are crucial.
It is with such determination that we formulated the "Tokyo Resiliency Project: Aiming for safety for the next 100 years," which sets out the roadmap to achieving our vision for Tokyo in the 2040s.

■ Next year, 2023, marks the centennial of the Great Kanto Earthquake. We will strongly promote this project, which will begin in this milestone year, to ensure that Tokyo, the capital of Japan, becomes a sustainable city that offers its residents peace of mind for the next 100 years to come.

■ Let us further strengthen our efforts from the three perspectives of self-support, mutual support, and public support, and together work to achieve a resilient Tokyo.

December 2022

Koike Yuriko
Governor of Tokyo 小池百合子

TOKYO Resilience Project
Aiming for “Safety for the Next 100 Years”

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Tokyo Metropolitan Government

Contents

Chapter 1: Concept of the Tokyo Resiliency Project

1 Background of the project's formulation

○ **Faced by the threat of natural disasters, all measures must be upgraded** in order to **protect the lives and livelihoods of Tokyo's residents and to maintain the functions and economic activities of the capital, which support all of Japan.**

○ Making the city more resilient will be very expensive and take a very long period of time. To ensure that **measures looking to the future will be carried out in a stable and continuous manner over the medium to long term**, the projects carried out by the TMG have been compiled in this Tokyo Resiliency Project.

2 Positioning of the project

(1) TMG's basic concept

○ **The safe and secure city of Tokyo, which could be called the crystallization of efforts of our predecessors, will be taken to higher levels and passed on to future generations.**

(2) Purpose of the project

○ The **projects to be undertaken by the TMG** are organized **under five risks** (floods and storms, earthquakes, volcanic eruptions, disruption of power, communications, etc., and infectious diseases), with the addition of **compound disasters**.

○ The responsible bureaus will collaborate with each other and implement their respective projects by **reflecting the resiliency project's contents in their individual measures and project plans.**

(3) Scope of the project

○ Among projects positioned as part of the "Future Tokyo: Tokyo's Long-Term Strategy," those that meet the following three criteria fall under this project.

① **Projects addressing the five risks** (measures responding to the five risks of floods and storms, earthquakes, volcanic eruptions, disruption of power, communications, etc., and for becoming a city resilient to infectious diseases)

② **Projects expected to be effective in overcoming risks in the promotion of this project*** (of projects to renew existing facilities, includes initiatives with the main purpose of ensuring the maintenance of functions in the event of a disaster)

③ **Projects for which the TMG is taking the initiative in participation and implementation** (including subsidies and policy guidance)

*There are other projects apart from those positioned in this project that contribute to improving disaster preparedness.

3 Basic policy for project formulation

(1) From a backcasting approach, upgrade measures based on assumptions shared throughout the TMG

○ **Utilizing a backcasting approach**, this project will begin by **envisioning a more resilient Tokyo in the 2040s**, and then work backwards to establish the roadmap from the present to that future vision. Along with determining projects for each risk and compiling the various measures and projects, **pioneering and distinctive efforts** will be listed as **leading projects**.

○ **Assumptions on the situation that are shared throughout the TMG are established as "common perspectives,"** and along with sharing crisis awareness throughout the TMG, **measures will be upgraded through the collaboration** of the relevant bureaus.

(2) Develop highly effective measures that center on hard infrastructure and its combination with soft infrastructure

○ **While focusing mainly on hard infrastructure measures, such as infrastructure development,** from the standpoint of maximizing the effectiveness of hard infrastructural preparations, also combine soft infrastructure measures such as utilizing digital technologies.

(3) Promote measures based on the standpoint of collaboration with diverse entities

○ Strengthen measures while **taking into consideration the importance of collaboration with various entities such as the national government, municipalities, businesses, Tokyo residents, and communities**, who work together with the TMG to realize a more resilient Tokyo.

Chapter 2: Five Imminent Risks and Compound Disasters Facing Tokyo

1 (1) Floods and storms that are becoming increasingly frequent and severe due to climate change

Situation in Tokyo

■ Tokyo is often subject to **flood damage** such as **river flooding and inland flooding** occurring from large volumes of stormwater flowing into rivers and sewer systems.

■ Sediment disasters **in the Tama mountains and the Tokyo islands** can have a serious impact on residents' lives by cutting off road access and **isolating** entire villages.

■ **Flood and storm damage could become more severe** as t**emperatures are expected to rise and the amount of rainfall to increase** in the future.

Future direction

➡ Continue to implement measures for floods and storms based on currently estimated levels.

➡ **Measures also need to be upgraded to address further intensification of floods and storms due to climate change.**

Common perspectives

■ Climate change scenario for development of infrastructure for the 2040s: Based on a **2℃ increase in average temperature**, the **amount of rainfall will increase by 1.1 times,** and the **sea level will rise as high as by about 60cm.**

■ Very strong tropical cyclones **with maximum wind speeds of at least 59m/s** will form more frequently in the future.

1 (2) Earthquakes that can happen any time and cause extensive damage

Situation in Tokyo

■ A **magnitude 7 class earthquake has a 70% probability** of striking the southern Kanto area **within the next 30 years.**

■ While **damage estimates** by the TMG, which were revised in May 2022, presented an improvement from previous estimates, it was again shown that **a major earthquake, such as one directly striking Tokyo, would cause extensive damage.**
Evacuation may be prolonged with the restoration of lifelines estimated to take 4 days for power and about 6 weeks for low-pressure gas* in a maximum damage scenario.
*Depending on the damage situation, it may take more time before service is available for use in homes, etc.

Future direction

➡ While showing some improvement, damage estimates are still high, making it **necessary to upgrade measures.**

➡ Appropriate response to **challenges arising from changes such as the city's demographics and housing environment** is also needed.

Common perspectives

■ Estimated damage from **a major earthquake directly striking the southern part of central Tokyo:**
- **Deaths: about 6,000; Buildings damaged: about 194,000**
- Possibility of **traffic disruption** on designated disaster response routes (in areas with a seismic intensity of upper 6 or higher)
- People needing to evacuate their homes due to **elevators stopping,** etc.
- Use of air conditioning, toilets, etc. disrupted due to suspension of **lifeline utilities**

■ Estimated damage from a **Nankai Trough megathrust earthquake**
- **Suspended delivery of daily commodities to the islands**

1 (3) Volcanic eruptions that will directly lead to complete evacuation of an island or paralyze urban functions

Situation in Tokyo

■ There have been 7 **volcanic eruptions on the Tokyo islands** in the last 100 years.
After the Miyakejima volcano eruption in 2000, it took **about four and a half years for the island evacuation order to be lifted.**

■ **Mt. Fuji** last erupted about 300 years ago. Low-frequency volcanic earthquakes occurring frequently around the year 2000 have again struck home that Mt. Fuji is an **active volcano.**

■ In a worst case scenario, a massive eruption of Mt. Fuji would result in **ash fall reaching the Tama area and even the 23 wards,** causing power outages, road traffic disruptions, suspension of rail services, and other **damage to the city's infrastructure.**

Future direction

➡ In the islands, promote the upgrading of measures based on **lessons learned to date**.

➡ To address potential **ash fall from Mt. Fuji, developing systems such as to clear roads and for the disposal of ash** in residential areas will be necessary.

Common perspectives

■ In the event of an eruption in the **islands:**
- **Residents will have to evacuate** due to tephra, ash fall, lava flow etc.

■ In the event of a large eruption of **Mt. Fuji** (worst case scenario):
- Ash fall will affect **transportation in 3 hours**
- **Ash fall will be 2-10 cm deep** in most parts of Tokyo's 23-ward area
- **Power outages, traffic disruption, suspended rail services**
- **Ash fall equivalent to nearly 10 times** the debris from the Great East Japan Earthquake (about **490 million ㎥)**

1 (4) Disruption of power, communications, etc. that will hinder residents' lives and social activity

Situation in Tokyo

■ The March 2022 earthquake off the coast of Fukushima
* caused **around 2.1 million households in TEPCO's service area to lose power.** It took about 3 hours to restore power, and even in the city, **elevators and traffic lights stopped working.**

■ With the widespread use of ICT devices, **telecommunication services have become an indispensable infrastructure for the everyday lives and social activities of Tokyo's residents.**

■ **Communication services were disrupted** at the time of the 2011 Great East Japan Earthquake. And a communications provider's equipment failure that occurred in July of that year not only disrupted voice and data communications, but had **significant impacts on urban activities** including ATMs and freight transport.

Future direction

➡ Although urban development to secure energy supply and strengthen communications in preparation for a disaster is making progress, it would be necessary to strengthen initiatives for **securing the stability of the information and communications infrastructure, and for its early restoration.**

Common perspectives

■ Power outage in the city caused by a major earthquake directly striking Tokyo
- Percentage of **power outages: 11.9%** (4 days for full restoration*)
  * Depending on the damage, it may take more time for service to become available in homes, etc.

■ Percentage of households possessing **smartphones: about 89%**

■ During the Great East Japan Earthquake, **voice calls were restricted by as much as 70-95%** due to congestion of mobile communications networks.

■ Build digital infrastructure for **business continuity even in the event of a disaster.**

1 (5) Infectious diseases that make close contact a risk and threaten socioeconomic activities

Situation in Tokyo

■ Due to factors such as more global movement of people and things, **new infectious diseases** originating in various parts of the world **spread beyond national borders.**

■ Tokyo is a cosmopolitan city with active inflow and outflow of people and things across borders. There will continue to be a **risk** of an infectious disease being brought in from overseas, leading to a new epidemic**.**

■ **The COVID-19 pandemic triggered changes in people's awareness and behavior,** such as maintaining social distance, avoiding closed-in spaces, expanding the use of remote work, and utilizing various modes of transportation.

Future direction

➡ As people's awareness and behavior change due to the pandemic, **a city that is resilient to infectious disease** as well must be built to prepare for outbreaks of new infectious diseases.

Common perspectives

■ **Due to the COVID-19 pandemic,**
- **Awareness of avoiding crowds and closed-in spaces** has made inroads.
- When it is recommended to wear a mask:
  Indoors: When it is not possible to **physically distance (by about 2 meters)**
  Outdoors: When conversing with others without physically distancing
- **High need for outdoor spaces** (ways for their greater use are needed)
- **Over 50%** of people surveyed want off-peak commuting and remote work to **become established practice.**

2 Risk of a compound disaster that will lead to more extensive and prolonged damage

Situation in Tokyo

■ Amid the increasing risk of each of these disasters, there is also a growing risk of compound or cascading disasters, such as **a new disaster striking before recovery from a disaster**, or **a natural disaster occurring during an infectious disease outbreak.**

■ Compared to damage caused by a single disaster, it is feared that **damage will be amplified by a compound disaster .**

■ The heavy rains of July and August 2021 during the COVID-19 pandemic, caused extensive damage across a wide area of Japan, and also revealed **the need to consider how to evacuate COVID patients recuperating at home and to set up infection prevention measures at evacuation centers.**

Possible compound disasters

○ **A large typhoon striking Tokyo during its recovery from a major earthquake directly hitting the city**

- The typhoon could cause storm surges and other damage in areas where coastal protection facilities, river facilities, and others were damaged by the tremors and liquefaction.

○ **An earthquake or flood occurring during the several years of a pandemic**
- Outbreaks of mass infection among evacuees

Chapter 3: Vision for a More Resilient Tokyo in the 2040s

1 Basic concept

Vision for a more resilient Tokyo in the 2040s

- **A city that can protect the lives of its residents to the maximum extent possible, keep damage within the city to a minimum, and restore urban functions quickly** achieved through the implementation of hard infrastructure measures, as well as soft infrastructure measures based on shifts in the social landscape, to address threats such as climate change and earthquakes.
- **A safe, secure, and sustainable city known for its thorough preparations for a broad range of crises** that attracts different forms of investment, as well as people from Japan and overseas.

Preparations for floods and storms

Preparations for earthquakes

Preparations for volcanic eruptions

Preparations for power and communications outages, etc.

Creating a city that is also highly prepared for infectious diseases

2 (1) Protecting residents from increasingly severe floods and storms

Vision for a more resilient Tokyo in the 2040s

■ Residents can live their lives **without feeling worried about flood and storm damage,** even in low-lying areas and areas alongside rivers or by the sea.

・Through reinforcement of river facilities and sewer system facilities, raising the height of sea walls, measures to ensure the accurate and prompt opening and closing of floodgates, strengthening of measures for underground shopping centers and subways, and improved disaster resistance of slopes and quays, as well as the conservation and utilization of natural features for flood control in line with the green infrastructure concept, flood damage and sediment disasters no longer occur.

■ Even if a disaster strikes, **evacuation sites and routes have been secured.**

・Safe evacuation is facilitated through pre-determined steps for phased evacuation and accelerated damage assessment and dissemination of information.

・A well-developed road network prevents disruptions in the transport of relief and keep residents from becoming isolated.

Goals (Policy Objectives)

Flood control measures

Ensure the ability to handle a 10% increase in rainfall due to climate change

・If the target rainfall stipulated under the current plan (probability of rainfall of 75mm/hour or more in the special-wards area occurring multiple times over a 20-year period) is maintained, that would mean an increase by a factor of 1.1 to approx. 85mm/hour.

*Target rainfall levels will be reviewed in the process of revising the TMG Basic Policy for Measures Against Heavy Rainfall.

Storm surge measures

Ensure the ability to deal with rising sea levels due to climate change (up to 60cm by the year 2100**)** (Port of Tokyo)

・To counter the rise in sea levels over time, designate priority to sea walls measuring approx. 60km in length and implement construction in phases (the planned maximum sea wall height in 2100 will be up to 1.4 meters higher than the current plan*).

*Subject to revision as necessary based on future findings and monitoring results.

Evacuation to higher ground

Establish emergency evacuation sites that can be accessed even by those who are late to evacuate

・Promote the development of high-spec levees on the Arakawa, Edogawa, and Tamagawa rivers in cooperation with the national government.

Subways, etc.

Ensure that subway users can evacuate safely even when rainfall exceeds the target amount

Sediment disasters

Prevent loss of human life and isolation due to sediment disasters

Measures for strong winds

Prevent power outages and accidents caused by objects such as signboards that turn into projectiles due to strong winds

Image of Key Initiatives

■Promotion of the development of regulating reservoirs, etc.
➢ Development of facilities that can adapt to climate change has advanced based on the results of studies of new construction and improvement methods, including those related to underground river facilities.

■Raising the height of sea walls
➢ Sea walls have been constructed to address the future rise of sea levels and stronger typhoons.

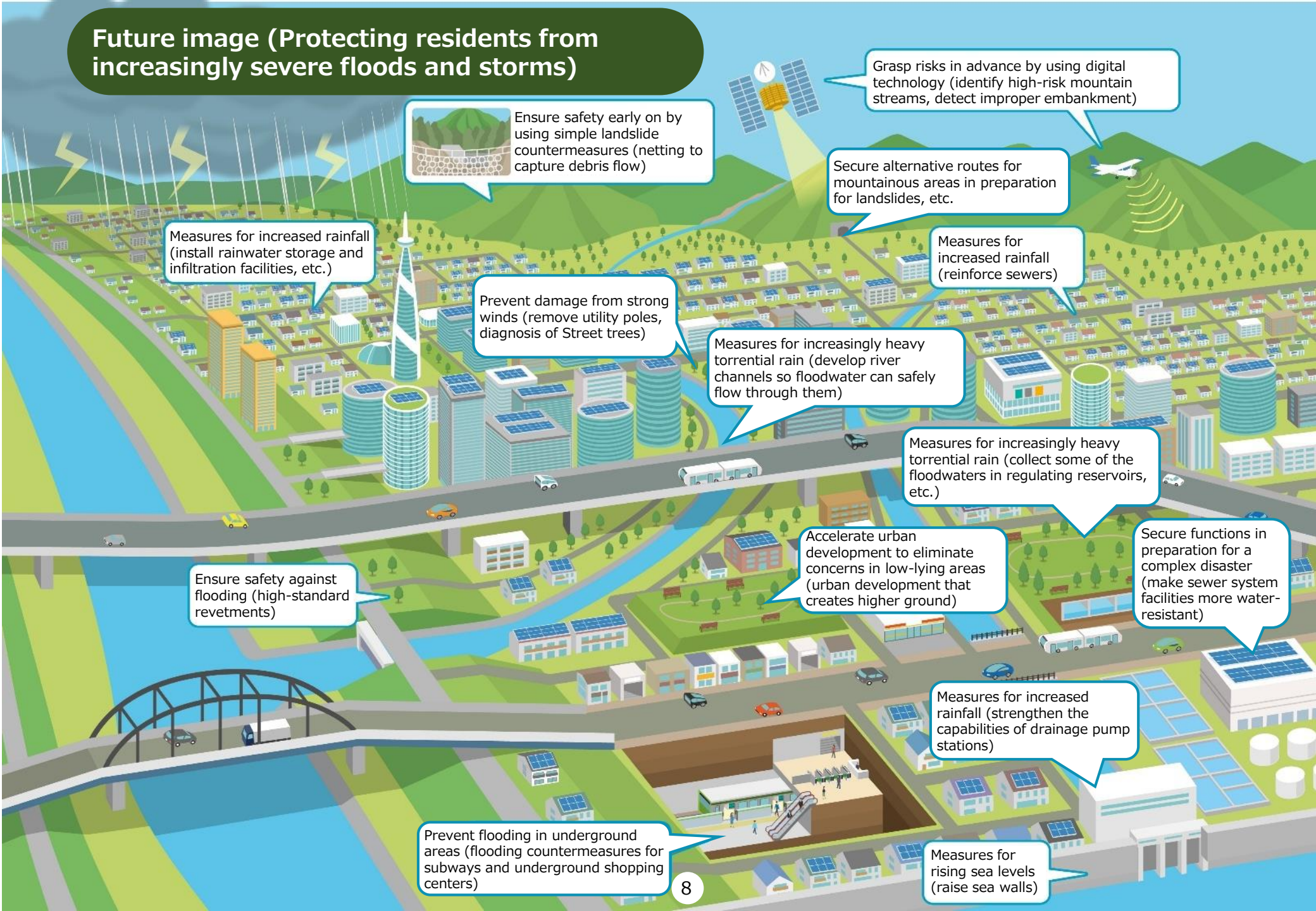
■Acceleration of urban development that creates higher ground
➢ Under a new framework, higher ground has been created to serve as a base for emergency rescue and other activities.

■Promotion of measures to prevent the flooding of subways and underground shopping centers (prevention of flood damage spreading)
➢ Underground spaces have been equipped with water-stop plates, flood prevention systems, and other devices to prevent water from entering through station entrances, ventilation openings, and tunnels.

■Elimination of concerns related to sediment disasters
➢ Progress has been made with respect to measures to protect human life and securing alternative routes.

■Prevention of damage caused by strong winds
➢ Progress has been made in eliminating factors leading to the collapse or damage of structures, etc.

Future image (Protecting residents from increasingly severe floods and storms)



2 (2) Building a city that “does not collapse, does not burn, and people survive” even in the event of a major earthquake

Vision for a more resilient Tokyo in the 2040s

■ **Earthquake-resistant buildings and communities that do not burn or spread fire** protect the lives and livelihoods of Tokyo residents.

- Along with improving the fire resistance of areas with close-set wooden houses, improving local disaster prevention capabilities will prevent the outbreak and spread of large-scale fires.
- Progress in making buildings earthquake-resistant and eliminating utility poles prevents them from collapsing or falling over when an earthquake occurs.

■ The **transportation network** that supports emergency response activities following an earthquake **has been secured**, enabling rescue and relief agencies to quickly reach their destinations.

- Extensive earthquake-proofing has been carried out along roads and an emergency transport network can be set up promptly by leveraging digital technology to assess damage at the time of a disaster.

Goals (Policy Objectives)

Emergency routes

Eliminate the causes of road blockages for designated disaster response routes (also prepare backup alternate routes for use in the event a blockage does occur)

- **Overall completion rate* of movement of vehicles between designated points on designated disaster response routes to 100%**

(*Measures the projected passibility of designated disaster response routes following a disaster)

Disaster management facilities

Realize improved disaster response capabilities

- **Secure multiple routes for the transport of emergency relief, as well as regional medical transport,** in the Tachikawa area and Tokyo’s waterfront area.

Areas with close-set wooden houses

Realize **communities that do not burn or spread fire**

- **Achieve a fire-resistant ratio of 70% or higher in development districts (Fireproof Zones), etc**.

Earthquake-resistant homes

Reduce the number of deaths due to building collapse, etc., caused by an earthquake that directly strikes Tokyo, etc., by around 80%*

- **Ensure that 100% of homes meet standards for earthquake resistance** (year 2000 building codes)

*Based on estimates for damage mitigation effects outlined in the May 2022 TMG damage estimates for a major earthquake that directly strikes Tokyo, etc.

Evacuation measures

Eliminate crowding in evacuation centers (evacuation centers in Tokyo can currently **accommodate approximately 3.2 million people)**

Tokyo Islands

Prevent the Tokyo islands **from becoming cut off when a disaster strikes**

- Ensure that each island has a quay designated for emergency transport

Image of Key Initiatives

■ Designated disaster response routes that link key disaster management facilities, etc.
- Earthquake-proofing of buildings along roads is complete.

■ Access routes to wide-area disaster management bases
- In areas surrounding disaster management bases, city-planned roads have been developed and grade separation with railway lines has been achieved, etc.

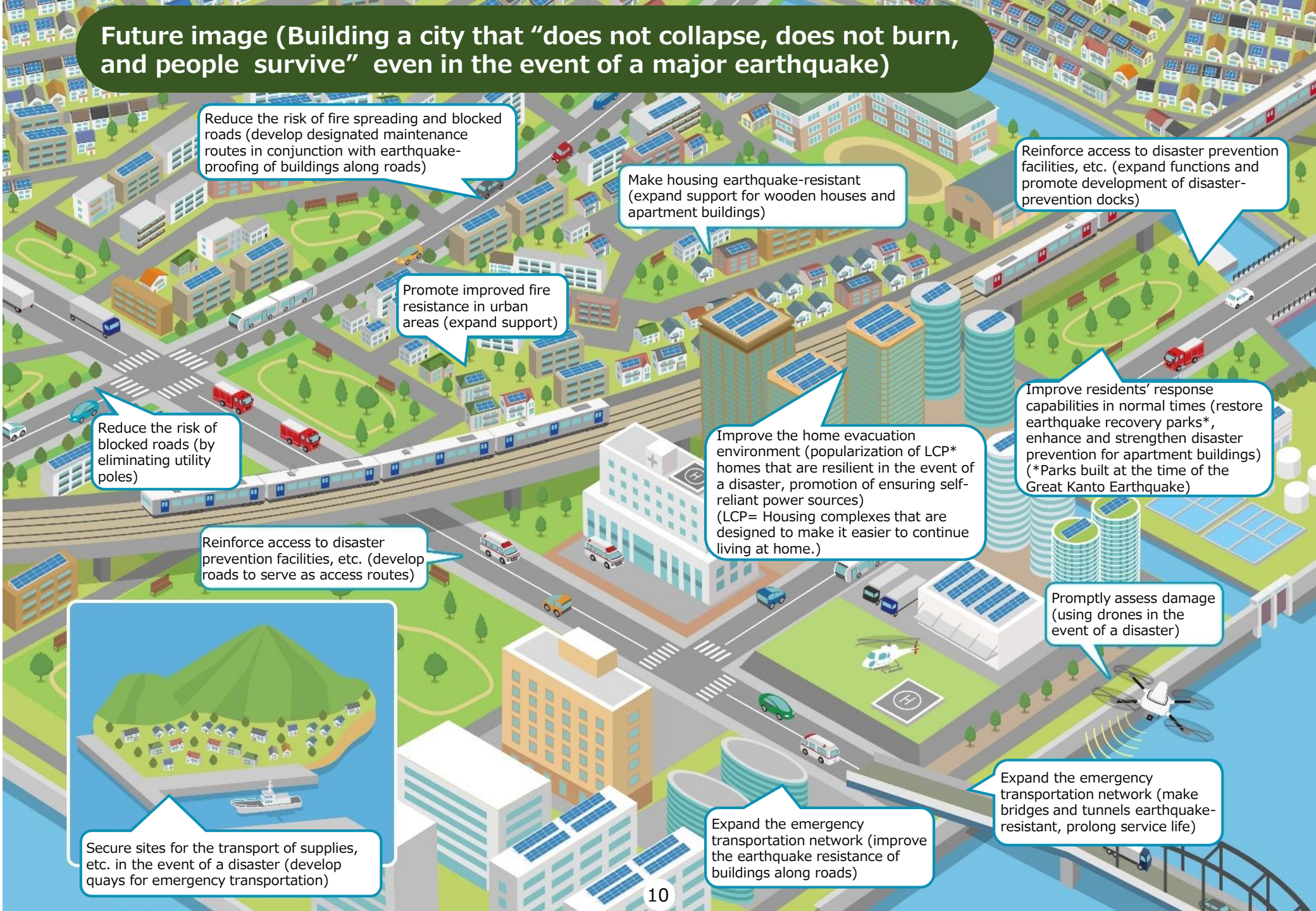
■ Improved fire resistance in areas with close-set wooden houses
- Fireproofing initiatives focused mainly on development districts, including the removal and reconstruction of old buildings, have been completed.

■ Seismic performance of homes and buildings
- All houses and buildings meet year 2000 building codes, eliminating concerns over building collapse.

■ Staying at home is an option following a major earthquake
- Equipment to facilitate staying at home rather than going to an evacuation center is secured for both detached homes and apartment buildings, and food and daily necessities are stockpiled by residents, etc.

■ Transportation bases for relief supplies, etc., to be used when an earthquake strikes
- Quays necessary for emergency transportation have been completed in the Tokyo islands.

Future image (Building a city that “does not collapse, does not burn, and people survive” even in the event of a major earthquake)



2 (3) Maintaining urban activities even if there is a volcanic eruption

Vision for a more resilient Tokyo in the 2040s

■ The lives and property of residents of Tokyo's islands are protected from debris flows, etc., and **island residents can evacuate safely.**

- Evacuation sites that have been reinforced to protect against volcanic ash and advanced preparation for evacuation facilitate proper evacuation actions.

■ Even in the event of ash fall generated by an eruption of Mt. Fuji, **transportation and lifelines will not be cut off for a prolonged period of time.**

- Damage to lifelines caused by ash fall is minimized by removing utility poles, covering water purification facilities or converting them into indoor facilities, and sharing ash fall forecasts.
- Prolonged interruption of urban functions is prevented by removing ash in stages based on information that is promptly obtained and analyzed.

Goals (Policy Objectives)

Image of Key Initiatives

Lifelines

Ensure that power, water, and natural gas continue to be supplied

■ Ensure that power and water continue to be supplied
- Necessary preparations have been advanced. This includes covering water purification facilities or converting them into indoor facilities and removing utility poles.
- *The supply of natural gas will not be impacted by ashfall.

Transportation network

Quickly restore the functionality of roads leading to critical facilities

・Ensure a **24-hour system** for removing volcanic ash through public-private collaboration.

■ Quickly restore the functionality of roads
- A system for clearing roads is in place, and materials and equipment, such as road sweepers for removing ash, have been secured.

Disposal of accumulated ash

In cooperation with the national government, other prefectures, etc., **secure temporary storage sites** for the total anticipated volume of ash fall from an eruption of Mt. Fuji (**approximately 490 million m³**).

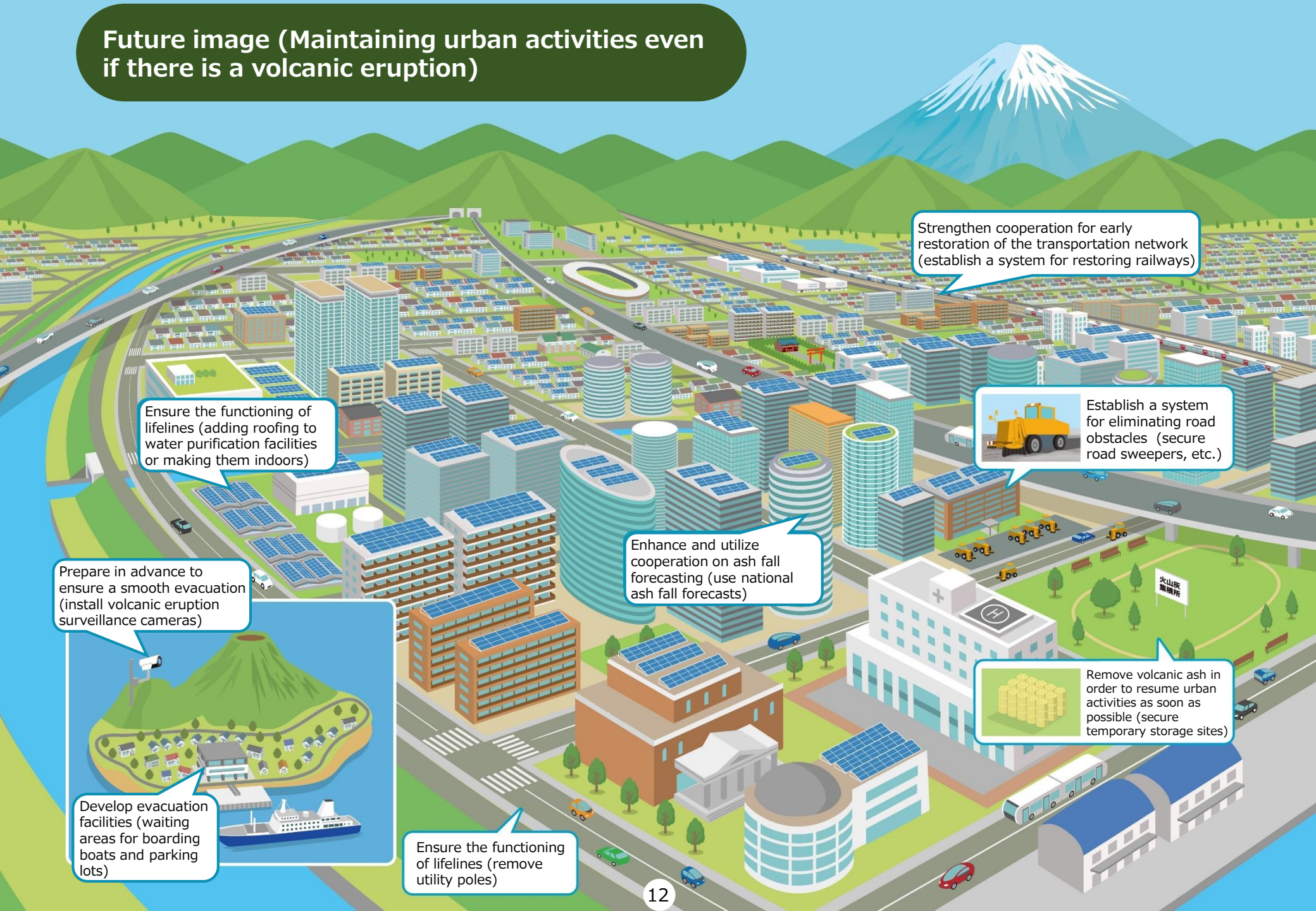
■ Removal of volcanic ash
- The division of roles between relevant organizations and the procedures for temporary storage, collection, and transportation methods have been specified.

Island areas

Ensure the **secure evacuation** of all island residents

■ Facilities required for evacuating people off the islands by ship
- Waiting areas to board ships have been designed to specifications that take volcanic ash into consideration.

Future image (Maintaining urban activities even if there is a volcanic eruption)



2 (4) Eliminating concerns about power, communications, and data when a disaster strikes

Vision for a more resilient Tokyo in the 2040s

■ Electricity can be "generated and stored," so **there is no need to worry that the city will go dark** when a disaster strikes.

- In addition to emergency power generation equipment, through promotion of the installation of self-sufficient and decentralized power sources, such as solar panels and storage batteries, and urban development that facilitates distribution of energy throughout an area, including installation of conduits, it is possible to generate and use energy when a disaster strikes.

■ Multiplexing forms of telecommunications will facilitate uninterrupted access to services, even during a disaster, **connecting anyone, anywhere, at any time.**

- When a disaster strikes, it is possible to use telecommunications services in all areas of Tokyo, including at evacuation centers and in the mountainous areas of Tama and on the Tokyo islands.
- Data and IT systems have been strengthened to ensure business continuity in the event of a disaster.

Goals (Policy Objectives)

Power

Reinforce the ability of the public facilities that protect the lives of Tokyo residents to **secure power**

Promote the adoption of **self-sufficient and decentralized power sources,** and develop communities where residents can safely evacuate or stay at home following a disaster.

⇒ Solar power generation equipment installed:
Capable of generating **2 million kW or more** (by 2030)

Communications

Realize a "Connected Tokyo" where anyone can be connected anytime, anywhere

⇒ Completely eliminate areas where people live and work in Tokyo with poor connectivity

Data

Make digital infrastructure more resilient to ensure continuity of operations even in the event of a disaster, and implement **disaster prevention measures using data.**

⇒100% of TMG systems will run on cloud-based infrastructure

Image of Key Initiatives

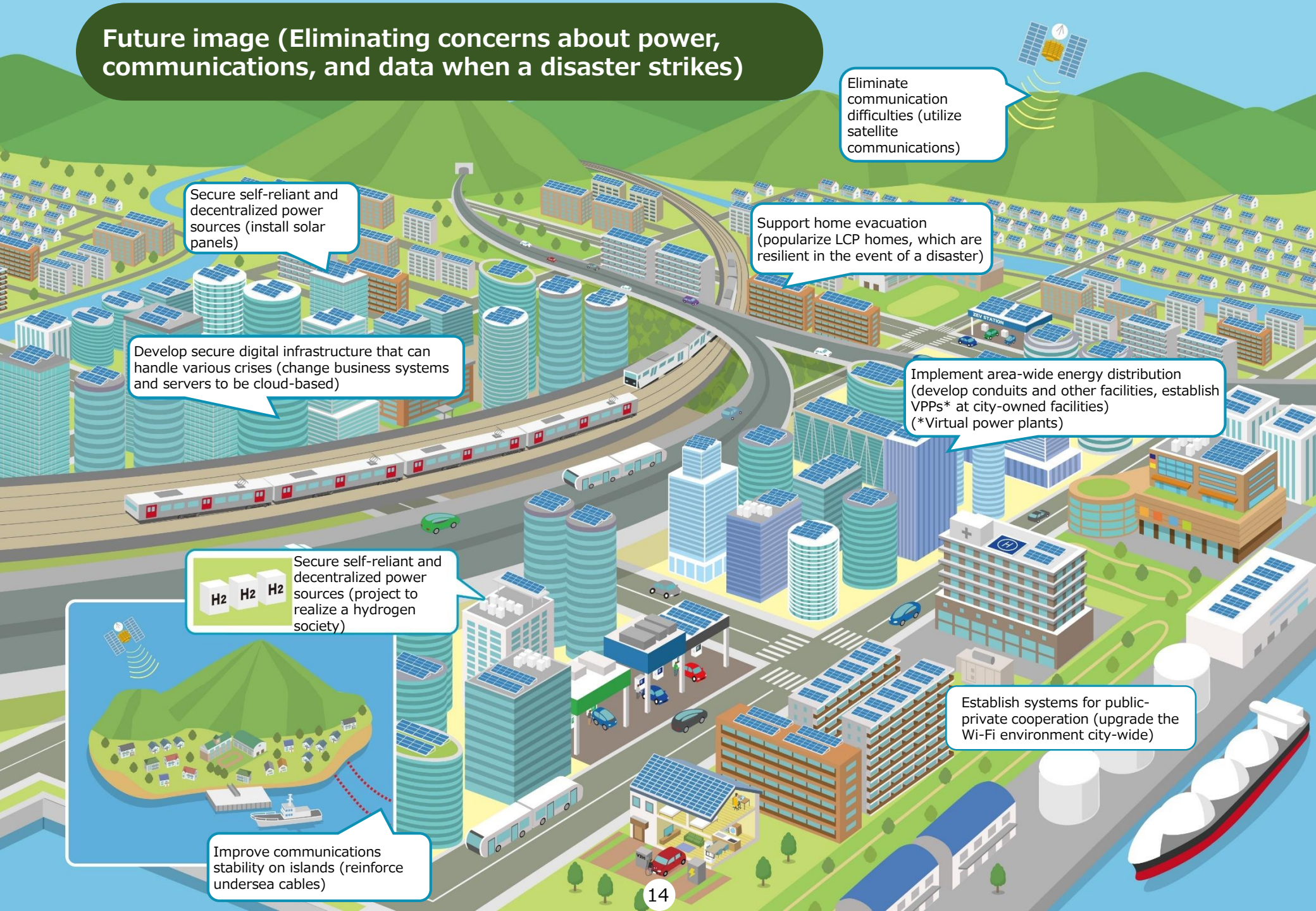
■ Power supply measures for infrastructure facilities that protect the lives of residents
- ➢ Adoption of self-sufficient and decentralized power sources such as solar power generation and storage batteries.
- ➢ Project to realize a hydrogen society

■ Urban development that eliminates concerns about power supply
- ➢ Promotion of the adoption of solar power systems and storage batteries
- ➢ Utilization of various urban development programs, etc., to encourage the introduction of renewable energy facilities, including solar power generation equipment, in addition to emergency power generation facilities

■ Secure communications networks
- ➢ Implementation of upgrades to the Wi-Fi environment at metropolitan government-owned facilities
- ➢ Introduction of state-of-the-art satellite communications to eliminate areas with poor connectivity

■ Data preservation and utilization
- ➢ Move TMG data and servers to a cloud-based system to ensure preservation
- ➢ Build digital infrastructure and run disaster management simulations using digital twins.

Future image (Eliminating concerns about power, communications, and data when a disaster strikes)



2 (5) Creating a city that is also highly prepared for infectious diseases

Vision for a more resilient Tokyo in the 2040s

■ Urban activities continue to play out as usual in **spaces where people can avoid crowding and gather with peace of mind.**

- Public spaces have been updated to be more human-centric, creating a city where people can check congestion levels at locations and gather with peace of mind.

■ Residents can choose from **diverse modes of transportation,** and everyone can move about the city comfortably, without worrying about the risk of infection.

- Diversification of transportation methods has progressed through upgrades to the cycling environment and development of water transportation routes, as well as the more widespread use of next-generation mobility.
- Thanks to progress in the development of office sharing, the environment for remote work, etc., and promotion of off-peak commuting and more even distribution of passengers in trains, etc., it is possible to comfortably use the train at any time of day.

Goals (Policy Objectives)

Image of Key Initiatives

Urban space

Comfortable public spaces that can be used for a variety of purposes, such as leisure activities or improving one's health, are conveniently located, enabling people to gather outdoors with peace of mind, anywhere, anytime.

■ A stage for urban activities where people can gather with peace of mind

- Public spaces have been reborn as pedestrian-friendly spaces by transforming areas around major terminal stations, roads, and other spaces.
- Local community development groups regularly hold a wide variety of events in open public spaces, etc.

■ Attractive parks and waterfront areas

- Park development and management that leverage the ingenuity of the private sector are widely implemented.

Modes of transportation

Cycling and other new modes of transportation are firmly established as a way to commute

- Secure **approximately 1,800km of bicycle lanes, etc.**

■ Methods of commuting to work or school that alleviate worry about infection

- Development of cycling lanes on metropolitan roads has advanced in Tokyo.
- New water transport routes have been developed to firmly establish it as a regular form of transportation.

Work styles & lifestyles

Make Tokyo a city where people have **flexible options, including living near their place of work, facilitating diverse workstyles and lifestyles**

■ Satellite offices near train stations

- Progress has been made with respect to establishing satellite offices near major railway stations.

Future image (Creating a city that is also highly prepared for infectious diseases)

Promote the use of bicycles (develop space for bicycle lanes)

Create outdoor spaces that elicit urban activities (walkable urban spaces)

Further utilization of spaces (increase opportunities to use public open spaces)

Develop working environments that are close to home (urban development through renovation of existing buildings)

Create outdoor spaces that elicit urban activities (make areas around train stations more convenient, create comfortable spaces, develop green pedestrian spaces)

Create spaces that make use of the natural environment (develop parks and waterfront spaces based on user needs)

Facilitate the comfortable use of railroads (disseminate information related to off-peak commuting, etc.)

Introduce next-generation mobility (autonomous driving mobility and the introduction of new mobility services)

Revitalize boat transit (using boats as a means of transportation)

Chapter 4: Projects to Address Each Risks

1 Project structure

Five Risks: Common Perspectives	22 Projects (hard x soft infrastructure measures)	List of projects (including 33 leading projects*) *Pioneering and distinctive projects, mainly new initiatives
(1) Protecting residents from increasingly severe floods and storms ・Climate change scenario for development of infrastructure for the 2040s: Based on a **2℃ increase in average temperature**, the amount of rainfall will increase by **1.1 times,** and the sea level will rise as high as by about **60cm.** ・Very strong tropical cyclones (maximum wind speeds of at least **59m/s**) will form more frequently in the future	01 Prevent **flooding** due to torrential rain, storm surges etc. 02 Protect the lives and livelihoods of residents from **flooding** 03 Prevent **landslides** along with ensuing isolation. 04 Prevent **damage from strong winds** due to typhoons, etc. 05 Enhance measures for floods and storms **on the islands**	・Further develop regulating reservoirs ・Raise sea walls and river revetments ・Promote urban development on higher ground and the building of high-standard revetments as urban infrastructure ・Use satellite data to detect improper embankment ・Make sewer system facilities more water-resistant etc. Details: p.18-
(2) Building a city that "does not collapse, does not burn, and survives" even in the event of a major earthquake ・Possibility of **traffic disruption** on designated disaster response routes (in areas with a seismic intensity of upper 6 or higher) ・Deaths: **about 6,000 ;** Buildings damaged: about **194,000** ・**Elevators stopping, lifelines cut off,** etc. ・**Suspended delivery of daily commodities to the islands**	01 Secure **emergency transportation routes** 02 Create communities that do not burn by **improving areas with close-set wooden houses** 03 Create communities that do not collapse and are not destroyed by **improving earthquake resistance**, etc. 04 Ensure **sustainability** of housing, infrastructure, and residents' lives 05 Measures for earthquake resistance and tsunamis on **islands**	・Expand support for earthquake-proofing to older wooden houses in the new building standards ・Support for the entire area to be developed, including priority development areas ・Establish a system for eliminating utility poles on private roads, etc. and subsidizing the costs ・Implement projects such as roads to serve as access routes for wide-area disaster prevention facilities ・Restore earthquake recovery parks etc. Details: p.22-
(3) Maintaining urban activities even if there is a volcanic eruption ・In the event of a large eruption of **Mt. Fuji** (worst case scenario): **Power outages, impeded traffic, etc.** due to **ash fall** (of **2-10cm** in most of the city) Ash fall equivalent to nearly **10 times** the debris from the Great East Japan Earthquake (**about 490 million m³)** ・In the event of an eruption in the **islands, residents** will **have to evacuate**	01 Improve the **sustainability** of urban **infrastructure** 02 Rapid **restoration** of urban **infrastructure** 03 Establish a **system for volcanic ash removal** 04 Facilitate the smooth evacuation of **island** residents	・Enhance the disaster information system and establish a network for sharing information with relevant organizations, etc. ・Prompt removal of volcanic ash for early resumption of daily life and other urban activities (secure temporary storage sites, etc.) ・Implement ash fall countermeasures for water facilities ・Develop waiting areas for boarding boats and parking lots that are needed for evacuation etc. Details: p.26-
(4) Eliminating concerns about power, communications, and data when a disaster strikes ・**Power outage rate** in the city caused by a major earthquake directly striking Tokyo: **11.9%** ・Percentage of households possessing smartphones: **about 89%** ・During the Great East Japan Earthquake, voice calls were **restricted by as much as 70-95%.**	01 Power supply measures for **infrastructure facilities** 02 **Creating a city** resilient to power supply insecurity 03 Securing **communications networks** 04 **Data integrity** and **utilization**	・Utilize satellite communications ・Project to realize a hydrogen society ・Project to boost locally-produced, locally-consumed renewable energy etc. Details: p.29-
(5) Creating a city that is also highly prepared for infectious diseases ・**Social distancing** has become widespread. ・Recommendations for when to wear a mask (indoors: when it is not possible to **physically distance (by about 2 meters)**, etc.) ・High need for outdoor spaces (**ways for their greater use** are needed) ・**Over 50%** of people surveyed want off-peak commuting and remote work to become established practice.	01 Create **comfortable outdoor public spaces** 02 Open development of **parks and waterfront** facilities 03 Diversify **modes of transportation** 04 Develop **work** environments that are within walking distance	・Create walkable urban spaces (Nishi Shinjuku) ・Revitalize the Tokyo Expressway (KK line) ・Develop comfortable, charming waterfront spaces along the Sumida river, etc. ・Increase opportunities to use public open spaces ・Use boats to diversify modes of transportation etc. Details: p.32-

2 (1) Protecting residents from increasingly severe floods and storms

Project Structure

Projects to address each risks	(Hard Infrastructure Measures)		(Soft Infrastructure Measures)
01 Prevent flooding due to torrential rain, storm surges etc. to the maximum extent possible	Further develop regulating reservoirs, etc. Raise sea walls, etc.	×	AI-based water level forecasting, etc.
02 Protect residents' lives and livelihoods from all possible forms of flooding	Prevent the spread of damage caused by flooding Accelerate urban development on higher ground	×	Use cutting-edge technology to identify and mitigate risks Prepare for Distributed Evacuation, etc. combining multiple evacuations
03 Prevent life-threatening landslides as well as isolation	Implement safety measures for landslides Reinforce access routes to the Tama mountains and island areas	×	Grasp risks in advance by using digital technology, etc. Accurate evacuation and prevention of isolation
04 Prevent damage from strong winds due to typhoons, etc.	Remove utility poles Eliminate factors leading to collapse or flying debris	×	Promote taking measures in advance for approaching typhoons
05 Enhance measures for floods and storms on the islands	Reinforce coastal protection facilities and harbor facilities on islands Remove utility poles on the islands	×	Assess damage using drones, satellites, etc. Use digital technology to accelerate and improve disaster recovery

2 (1) Protecting residents from increasingly severe floods and storms

Leading Projects

Further river development (revetments, regulating reservoirs, etc.)

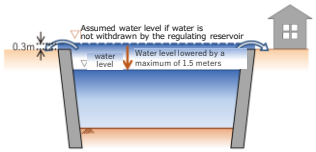
○ While regulating reservoirs have already demonstrated their effectiveness, current countermeasures for torrential rain (1/20[1] annual probability of exceeding the baseline) still have a long way to go

Near term: To speed up the development of regulating reservoirs, achieve the target (operationalization of a new regulating reservoir (capacity of 1.5 million cubic meters) earlier than originally planned

were effective

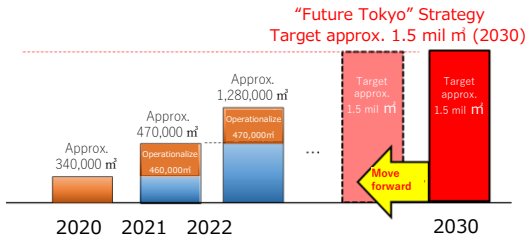
Protected Tokyo from flooding during Typhoon Hagibis in September 2019

Storage ratio: **91**%(490,000㎥)



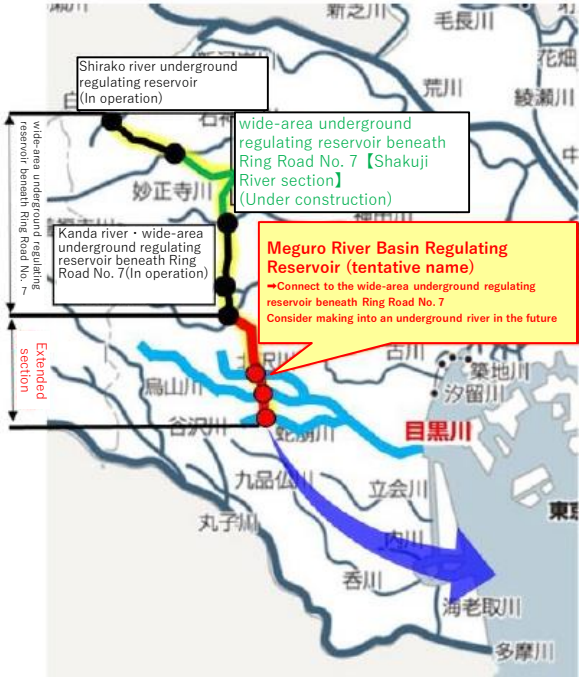
Kanda River/Ring Road Regulating Reservoir

Future operationalization schedule



○ Measures to address climate change, such as the future increase in rainfall, will also be necessary

Extension of the wide-area underground regulating reservoir beneath Ring Road No. 7 (Meguro River Basin Regulator Reservoir (tentative name))



Medium to long term: Develop facilities to respond to climate change based on the results of studies of new maintenance methods,[2] including underground rivers.

1. The probability each year of rainfall exceeding the baseline amount one or more times a year is 1 in 20 (5%). Using estimates based on actual rainfall to date as a reference, this corresponds to 75mm of rainfall or more per hour in the central wards of Tokyo and 65mm or more per hour in the Tama area.
2. From fiscal 2022 to 2023, the Committee for the Study of River Improvement in Tokyo will consider the policy for Tokyo's river maintenance facilities, etc. in light of the future impact of climate change. In addition, the Committee for the Study of Countermeasures against Torrential Rainfall in Tokyo will consider the division of roles, etc. for river and sewer system maintenance, installation of storage and infiltration facilities, and other measures.

2 (1) Protecting residents from increasingly severe floods and storms

Leading Projects

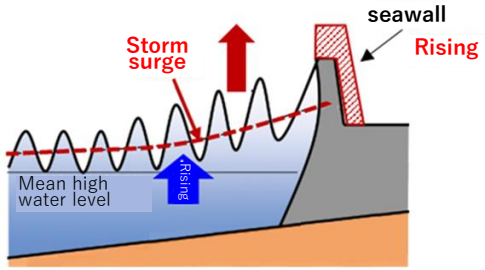
Raise sea walls and river revetments

- The 1959 Super-Typhoon Vera was a key trigger that led to commencing the construction of seawalls to protect the entire Port of Tokyo. Today, the seawalls are nearly complete.
- Given the future rise in sea levels (by as much as 60cm in 2100) and stronger typhoons, the height of the sea walls will be raised in stages.

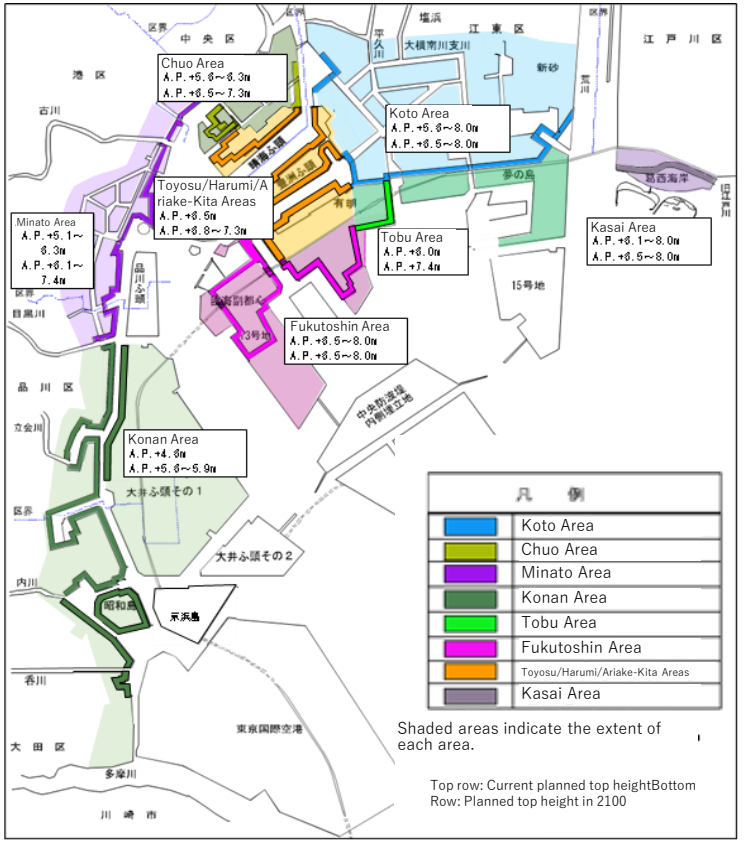
[Port of Tokyo]

- As sea levels will rise over time, each area will be studied to determine the priority, and <u>the height of sea walls will be raised in stages</u> before they are no longer high enough.

Raising of sea walls (image)



Current planned top height of sea walls in each area and future planned top height



[Rivers]

- Consider and implement measures based on the Committee for the Study of River Improvement in Tokyo (end of fiscal year 2023).

2 (1) Protecting residents from increasingly severe floods and storms

Leading Projects

Promote urban development on higher ground and building of high-standard revetments as urban infrastructure

- (Near term) Using parks and other public facilities, accelerate efforts to secure elevated locations.
- (Medium to long term) Cooperate with the national government to promote urban development on higher ground to function as a hub, while also keeping the introduction of new mechanisms in view.

Develop an evacuation network to vertical evacuation sites and out of flooded areas

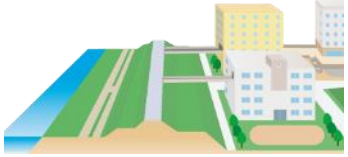


*Image of urban development on higher ground (building cluster) taken from the vision for creating a disaster-resilient Tokyo

Public facilities moved to higher ground

Secure higher ground to serve as a base for rescue and relief operations, etc. (Arakawa, Edogawa, and Tama rivers)

*Image taken from the Ministry of Land, Infrastructure, Transport, and Tourism working group on promoting measures for building on higher ground

Use satellite data to detect improper embankment

- Use satellite observation data to efficiently detect improper embankment

Image of using satellite data to detect improper embankment

Flooding measures, etc. for subways

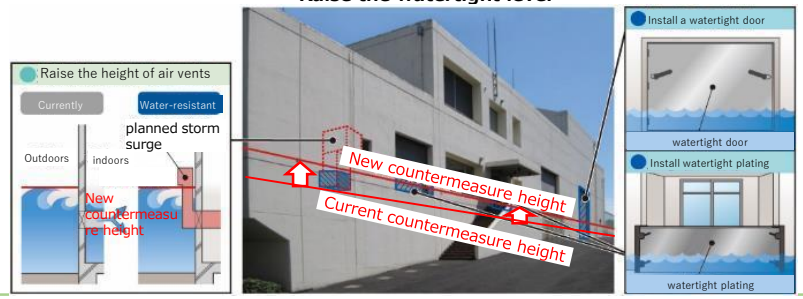
- Stop flooding through subway station entrances by equipping with or reinforcing watertight plating, etc.
- Stop the spread of flooding to other areas through tunnels by installing watertight gates, etc.
- Improve evacuation guidance measures in the event of flooding.

Examples of flooding countermeasures for subways

Make sewer system facilities more water-resistant

- In anticipation of the aftermath of a major earthquake, make sewer system facilities more water-resistant in order to cope with storm surges, etc. in view of the effects of climate change.

Raise the watertight level



Chapter 4: Projects to Address Each Risks

2 (2) Building a city that "does not collapse, does not burn, and survives" even in the event of a major earthquake

Project Structure

Projects to address each risks	(Hard Infrastructure Measures)		(Soft Infrastructure Measures)
01 Secure the emergency transportation network in the event of a major earthquake	Expand and strengthen the emergency transportation network Reinforce access to disaster prevention facilities, etc.	×	Utilize AI and other technologies for infrastructure maintenance and management Assess damage using drones and social media
02 Create communities that do not burn by improving close-set wooden housing areas	Promote improved fire resistance in urban areas Reduce the risk of fire spreading and blocked roads through the development of designated Route for Improvement	×	Enhance disaster response capabilities based on regional characteristics Improve regional disaster prevention capabilities by using digital technology, etc.
03 Create communities that do not collapse and are not destroyed by improving earthquake resistance, etc.	Promoting the seismic resistance of buildings Remove utility poles in conjunction with development, etc. Promote earthquake-proofing and countermeasures for liquefaction in communities	×	Promote risk assessment for the implementation of liquefaction countermeasures
04 Ensure the sustainability of housing, infrastructure, and residents' lives following a major earthquake	Ensure the sustainability of urban infrastructure	×	Improve the home evacuation environment, including medium- to high-rise housing Prompt and smooth preparation of evacuation centers, etc. to receive evacuees Strengthen citywide measures for people who have difficulty returning home Raise residents' disaster prevention awareness and improve their response capabilities in normal times
05 Measures for earthquake resistance and for tsunamis on islands	Remove utility poles on the islands Secure sites for transport of supplies in the event of a disaster	×	Strengthen system to secure safe evacuation sites Assess damage using drones, satellites, etc. Use digital technology to accelerate and improve disaster recovery

2 (2) Building a city that "does not collapse, does not burn, and survives" even in the event of a major earthquake

Leading Projects

Expand support for earthquake-proofing to older wooden houses in the new building standards

○ By promoting improved earthquake resistance in buildings constructed under old earthquake-proofing standards (those built before 1981), damage from earthquake tremors or buildings collapsing has been steadily decreasing.

○ To further reduce damage, it will be effective to improve the earthquake resistance of around 200,000 wooden houses constructed under lower earthquake-proofing standards (built between 1981 and 2000), prior to the latest earthquake-proofing standards that came into effect in 2000.

・As of 2019, the ratio of houses in Tokyo that meet the year 2000 earthquake-proofing standards is estimated to be in the upper 80% range.

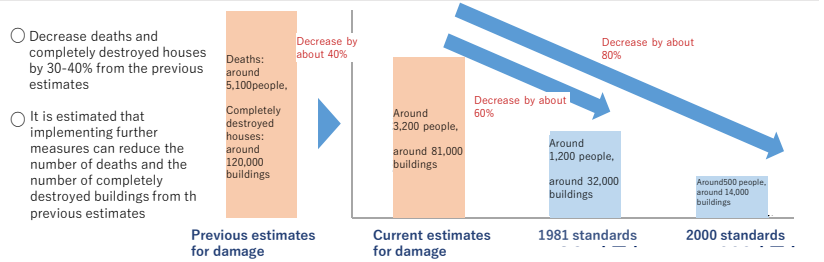
・Completing earthquake-proofing is estimated to be able to reduce the number of deaths by about 80%.

(from estimates for damage following an earthquake under Tokyo, etc.)

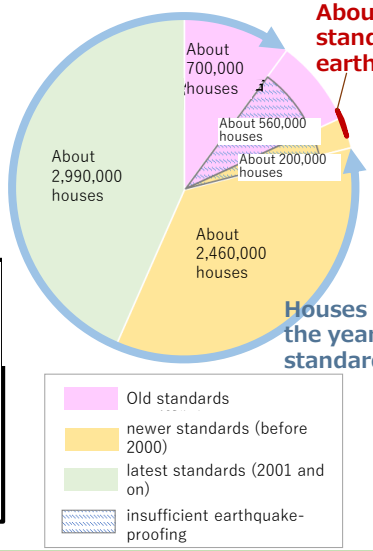
○ <u>Launch new support</u> to improve the earthquake resistance of wooden houses built under the newer standards (between 1981 and 2000), eliminating nearly all houses that do not meet the year 2000 standards.

Damage mitigation effects
(estimates for damage following an earthquake under Tokyo, etc.)

Item	Currently	Promote 1	Promote 2
Promote improved earthquake resistance	92% earthquake-proofing rate for houses, etc.	100% earthquake-proofing rate (1981 standards)	Year 2000 standards



Building Age of Houses in Tokyo



About 200,000 houses of those built to the newer standards (prior to 2000) are not sufficiently earthquake-resistant

A wooden house built to the pre-2000 standards that collapsed due to the Kumamoto earthquake

Source: Quick Report of the Field Survey and Building Damage by the 2016 Kumamoto Earthquake
(National Institute for Land and Infrastructure Management)
http://www.nilim.go.jp/lab/hbg/0929/pdf/isshiki.pdf

2 (2) Building a city that "does not collapse, does not burn, and survives" even in the event of a major earthquake

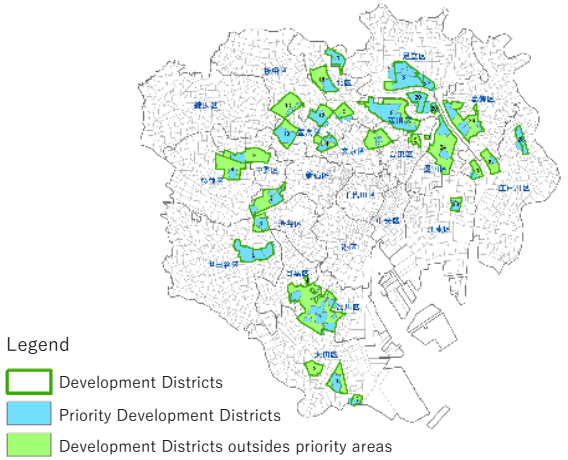
Leading Projects

Support for the Development Districts including the Priority Development Districts

○ Through support for efforts including the removal or reconstruction of old houses, renovations to ensure a city that does not burn have made progress in areas with close-set wooden houses, but support must be expanded in order to speed up progress.

(Ratio of fire-resistance in the Priority Development Districts : 64.0% of the area for fire-proofing as a whole (reference value as of end-2020) against the 2025 target of 70% in half the areas)

○ Priority Development Districts : Add subsidies for building construction expenses in the Fireproof Zone system (strengthen existing program)
○ Development Districts outsides priority areas: Establish subsidies for design and supervision costs associated with removal or reconstruction (new)



Status of identifying areas to the Development Districts and the Priority Development Districts

Establish a system for eliminating utility poles on private roads, etc. and for subsidizing the costs

○ While support is provided for removing utility poles on private roads, etc. in the Priority Development Districts, because private roads, etc. that pose a high risk of utility poles collapsing span entire areas with close-set wooden houses, it is necessary to encourage the removal of utility poles without missing any potential needs.

(Road eligible for subsidies)

○ Going forward, expand the areas eligible for subsidies to the Development Districts that are high-risk in the event of a disaster and to areas for promoting disaster prevention-oriented redevelopment.
○ Refine existing programs by compiling more case studies early on.

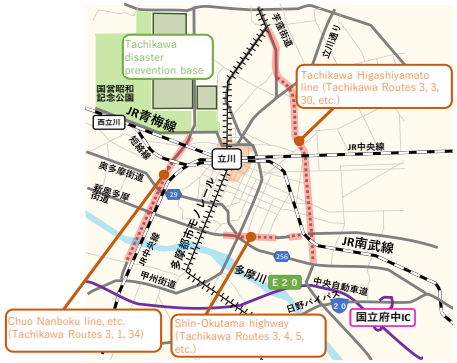
2 (2) Building a city that "does not collapse, does not burn, and survives" even in the event of a major earthquake

Leading Projects

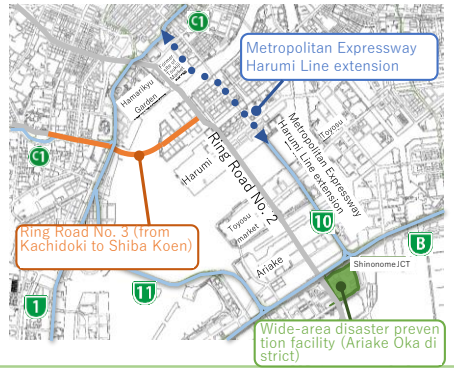
Implement projects such as roads to serve as access routes for wide-area disaster prevention facilities

- Develop roads in the vicinity of the Tachikawa wide-area disaster prevention base, and add raised intersections with the JR Ome line.
- Promote efforts in cooperation with the national government, etc. in order to operationalize the Harumi line extension of the Metropolitan Expressway, which will contribute to strengthening the links between the city center and the waterfront area.

TMG-planned roads in the vicinity of the Tachikawa wide-area disaster prevention base



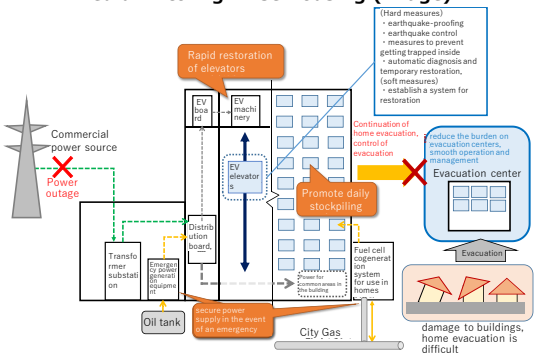
Area surrounding the Tokyo Bay waterfront core wide-area disaster prevention facility (Ariake Oka)



Enhance and strengthen disaster prevention for apartment buildings, etc.

- Support home evacuation in medium- to high-rise housing by promoting the securing of power sources in the event of an emergency, strengthening cooperation with manufacturers to ensure rapid restoration of elevators, and raising awareness of daily stockpiling.

Development of the home evacuation environment in medium- to high-rise housing (image)



Restore earthquake recovery parks

- Earthquake recovery parks were developed adjacent to elementary schools under the reconstruction plans following the Great Kanto Earthquake by proposal of the city of Tokyo.
- On the occasion of 100 years passing since the Great Kanto Earthquake, TMG is encouraging the restoration of these parks by the relevant wards, based on the thinking of that time.
- By restoring earthquake recovery parks, we hope to raise awareness of disaster prevention among all generations.

Utilize the city's excess capacity to promote the protection of visitors to Tokyo

- Ensure "room to grow" for private-sector measures for people who have difficulty returning home in cooperation with local community development councils that offer help to visitors to Tokyo in areas around major train stations, etc., depending on the disaster situation.

2 (3) Maintaining urban activities even if there is a volcanic eruption

Project Structure

Projects to address each risks	(Hard Infrastructure Measures)		(Soft Infrastructure Measures)
01 Improve the sustainability of urban infrastructure in the event of ash fall	Ensuring the functioning of lifelines (power, water)	×	Enhance and utilize cooperation on ash fall forecasting
02 Rapid restoration of urban infrastructure in the event of ash fall			Establish a system for early restoration of road functions Strengthen cooperation for early restoration of the transportation network Restore lifelines (power, sewage, etc.) as soon as possible
03 Establish a system for volcanic ash removal as a city-wide effort to restore daily life			Remove volcanic ash in order to reopen facilities as soon as possible Dispose of volcanic ash to restore urban functions Foster awareness of preparing for ash fall
04 Smooth evacuation of island residents in the event of a volcanic eruption	Develop evacuation facilities	×	Assess damage using drones, satellites, etc. Prepare in advance to ensure a smooth evacuation Use digital technology to accelerate and improve disaster recovery

2 (3) Maintaining urban activities even if there is a volcanic eruption

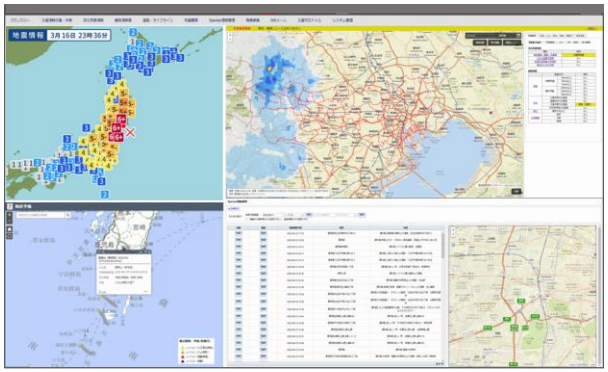
Leading Projects

Enhance the disaster information system and establish a network for sharing information with relevant organizations, etc.

- As the areas that will be impacted by ash fall vary significantly depending on the wind direction, it is vital to assess damage quickly.
- Enhancing coordination with relevant parties on disaster information is necessary for emergency countermeasures and accelerating the restoration of infrastructure (common to response to floods and storms, earthquakes, etc.).

- Add the display of national ash fall forecasts to the TMG disaster information system.
- Establish a system for communicating with relevant local governments and specified public institutions, etc. (infrastructure, transportation, etc.)

Enhanced disaster information system

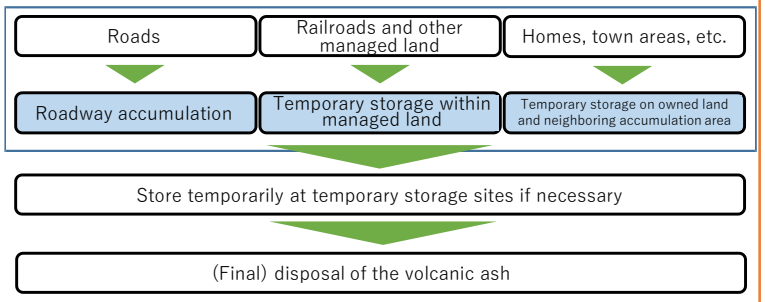


Prompt removal of volcanic ash for early resumption of daily life and other urban activities (secure temporary storage sites, etc.)

- Establishing a systematic method for disposing of volcanic ash is necessary in order to restore urban functions
  - The estimated amount of ash fall is equivalent to about 10 times the amount of debris from the 2011 Great East Japan Earthquake.
  - The basic method for ash disposal (including the division of roles in the region) is being considered in collaboration with the national government.

- Sort out the division of roles between relevant organizations and the steps to be taken based on research and discussion of temporary storage sites for volcanic ash and methods for collection and transport.

Process from removal of volcanic ash to final disposal



2 (3) Maintaining urban activities even if there is a volcanic eruption

Leading Projects

Implement ash fall countermeasures for water facilities

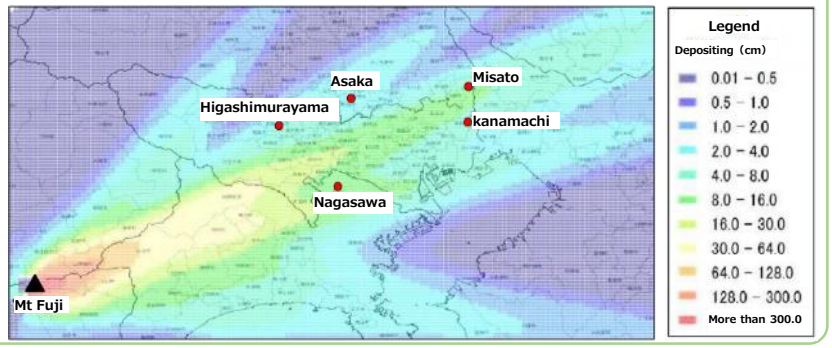
○ Add roofing to the sedimentation tanks at the Nagasawa water purification plant, which is at risk of exceeding the criteria for water quality in the event of ash fall.

*The impact from ash fall at large water purification facilities (Higashi Murayama, Kanamachi, Misato, and Asaka) is not at a level that would result in exceeding the water quality criteria, and can be reduced further with advanced water purification treatment.

Development to add roofing to sedimentation tanks (image)

Before installation	After installation
	

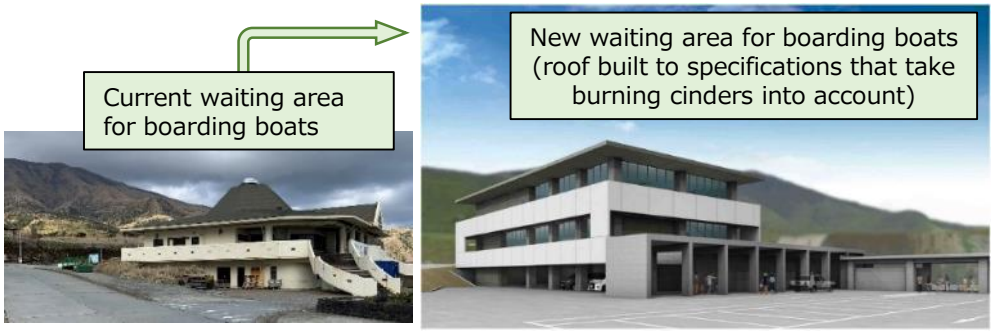
Simulation of ash fall deposit amounts (WSW winds prevailing)
(created based on a national study on ash fall in the event of a large eruption)

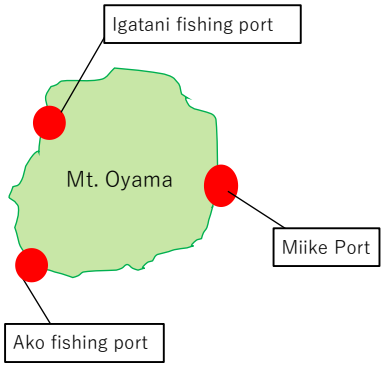


Develop waiting areas for boarding boats and parking lots needed for evacuation after a volcano disaster

○ Renovate waiting areas for boarding boats located within 3km of the mouth of a volcano to ensure that roofing is designed to specifications that take cinders into account and into a facility that has a parking lot.

Development of Port of Miike passenger waiting area (image)





Chapter 4: Projects to Address Each Risks

2 (4) Eliminating concerns about power, communications, and data when a disaster strikes

Project Structure

Projects to address each risks	(Hard Infrastructure Measures)		(Soft Infrastructure Measures)
01 Power supply measures for infrastructure facilities that protect the lives of residents	Promote the securing of self-reliant and decentralized power sources Implement area-wide energy distribution at city-owned facilities	×	Cooperation for stable power supply Cooperation for early restoration of power after an outage
02 Create a city resilient to power supply insecurity as a city-wide effort	Promote the securing of self-reliant and decentralized power sources Promote area-wide energy distribution	×	Support for home evacuation Support for the introduction of disaster prevention measures
03 Ensure a reliable communications network	Ensure an environment in which everyone can safely access digital services	×	Establish systems for public-private cooperation
04 Ensure data integrity and utilize data to improve resilience	Develop the digital infrastructure necessary for business continuity in the event of a disaster	×	Realize advanced disaster prevention measures through the effective use of data

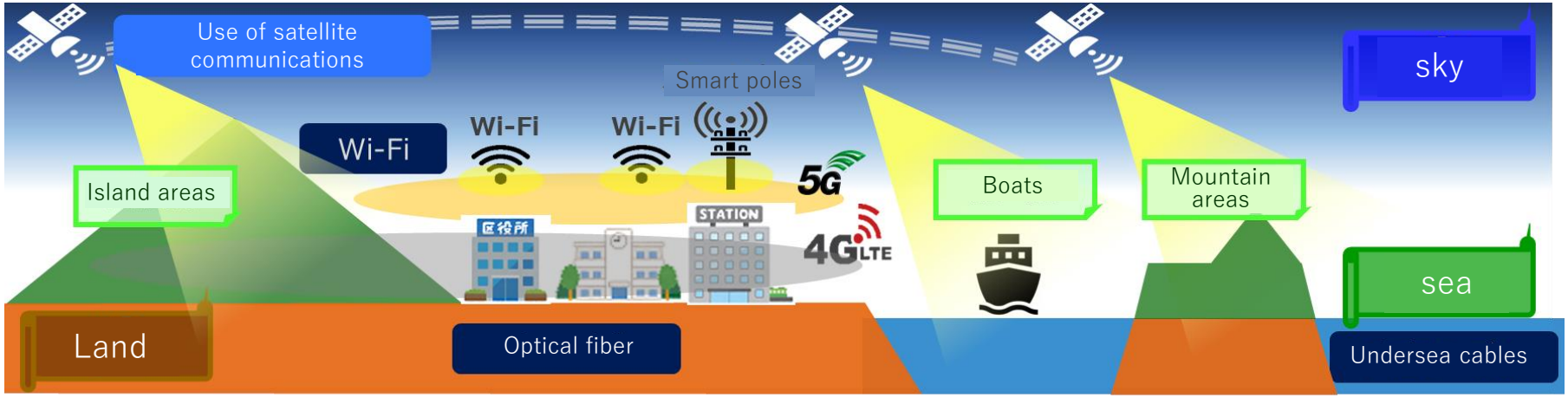
2 (4) Eliminating concerns about power, communications, and data when a disaster strikes

Leading Projects

Utilize satellite communications

- It is necessary to ensure communications redundancy by using multiple transmission routes, even in the event of communications failures or a disaster.
- Securing a new means of high-speed internet communications in addition to improving base stations will be effective for the Tama mountains and on the islands as well as for boats or other locations where communications difficulties cannot be easily resolved due to the lack of mobile base stations.
- For this reason, a project is being launched to utilize satellite communications to secure communications redundancy and eliminate areas with communications difficulties, such as the Tama mountains, island areas, and boats.

The Tama mountains, the islands, and ocean-going ships will be the first to adopt state-of-the-art satellite communications, aiming to eliminate areas with communications difficulties and achieve a "Connected Tokyo" where anyone can access digital services.



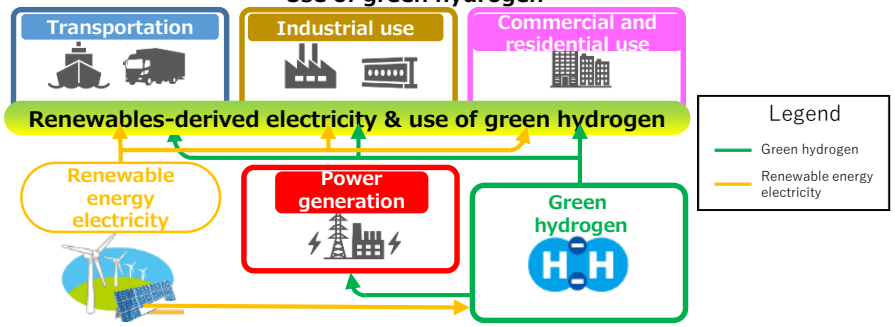
2 (4) Eliminating concerns about power, communications, and data when a disaster strikes

Leading Projects

Project to realize a hydrogen society

○ **Consider systems for supplying hydrogen such as pipelines and promote full-scale use of renewable energy-derived green hydrogen* in all fields.** (*Produced using electricity derived from renewable energy sources.)

Use of green hydrogen



Project to boost locally-produced, locally-consumed renewable energy

○ **Support the introduction of solar power generation and storage batteries by municipalities and private-sector businesses in order to increase the spread of locally-produced, locally-consumed energy.**

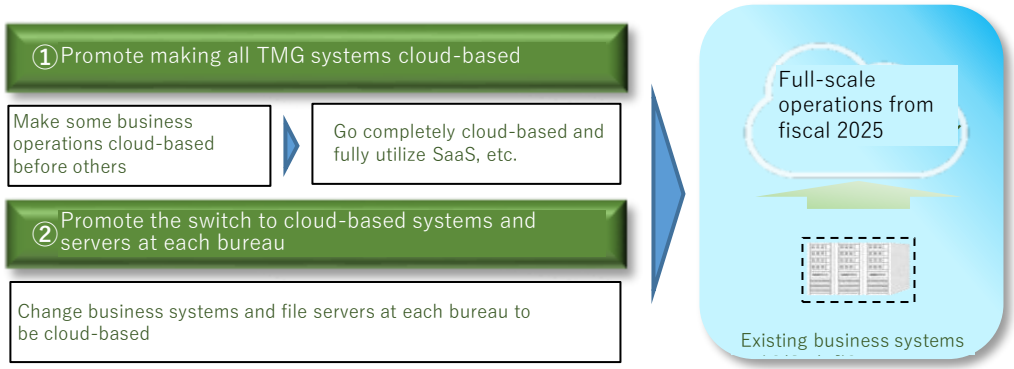
Local production and consumption of renewable energy

Change business systems and servers to be cloud-based

○ **It is vital that IT systems and information assets necessary for business continuity are properly preserved in the event of a disaster.**

○ **Develop digital infrastructure that allows data to be used and business operations to continue even if government buildings sustain damage.**

Switching to cloud-based systems, etc.



2 (5) Building a city that is resistant to infectious disease

Project Structure

Projects to address each risks	(Hard Infrastructure Measures)		(Soft Infrastructure Measures)
01 Create comfortable spaces that will lead to enhanced outdoor urban activities	Create outdoor spaces that can elicit a variety of urban activities	×	Further utilization of these spaces by expanding the scope of ways they can be used Making a Tokyo a smart city by obtaining and disseminating information on the movement of people, etc.
02 Develop open parks and waterfront areas that anyone can use	Create unique spaces that make use of the natural environment	×	Use these spaces in a more appealing way through the ingenuity of the private sector Disseminate data on crowd congestion
03 Diversify modes of transportation that also contribute to reducing the risk of infection	Promote the use of bicycles Revitalize boat transit	×	Facilitate the comfortable use of railroads Introduce next-generation mobility
04 Improve working environments that are within walking distance	Develop the environment for remote working and working close to home	×	Raise awareness to create opportunities for diverse ways of living and working

2 (5) Building a city that is resistant to infectious disease

Leading Projects

Create walkable urban spaces where people can unwind and enjoy taking a stroll (Nishi Shinjuku)

○ Half a century has passed since the construction of the Shinjuku subcenter area, and reorganization is necessary to make it into a human-centric urban space in response to changes in society and the surrounding environment.

・Shinjuku's vast open space and roads are not being utilized, and it is not a comfortable place to be for workers or visitors.

・It is not an easy environment to navigate, as destinations like train stations and parks are far apart, and there are physical barriers to easy movement such as differences in elevation.

・Meanwhile, the COVID-19 pandemic has created the need for new urban development, such as outdoor workspaces.

○ Create iconic and bustling spaces through an integrated reorganization of roads, public spaces, etc. (No. 4 road, Citizen's Plaza, etc.)
○ Promote the introduction of next-generation mobility and reorganizing the areas around TMG, etc.
○ Utilize cutting-edge communications infrastructure, etc. to develop comfortable workspaces for indoor or outdoor use.

Integrated reorganization of roads, public spaces, etc.

Public spaces that give rise to diverse interactions and ways of spending time there

Comfortable outdoor work spaces

2 (5) Building a city that is resistant to infectious disease

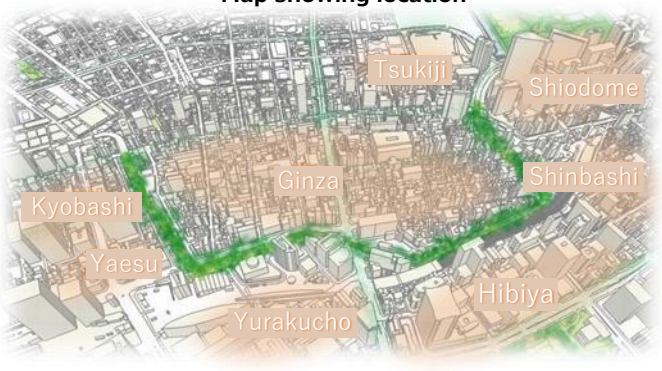
Leading Projects

Revitalize the KK line as a pedestrian-centered public space

- As a measure to ensure the smooth traffic flow of large vehicles moving in a circular direction, which will be necessary as a section of the Metropolitan Expressway in the Nihonbashi area is being moved underground, a policy has been announced to develop the Shin-Kyobashi connecting route (underground) to serve as a new loop route for the city center, which will significantly reduce the role of the Tokyo Expressway (KK line) as an automobile-only roadway.
- To create new value and appeal for Tokyo, the upper area of the KK line will be revitalized and utilized as a pedestrian-centered public space.

- Taking advantage of the KK line's existing form as an elevated roadway, construct a wide-area pedestrian network along with a large-scale green network utilizing the continuous outdoor space, making use of existing structures to enhance the value and attractiveness of the area.
- The target timeline for completion of all sections of the KK line's upper area is between 2030 and 2040, with certain sections opening earlier through phased development in coordination with urban development in the area.

Map showing location



Example of development details

2 (5) Building a city that is resistant to infectious disease

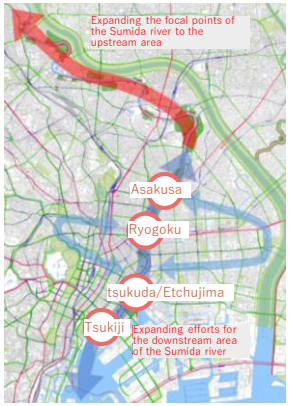
Leading Projects

Develop comfortable, charming waterfront spaces along the Sumida river, etc.

○ Initiatives to develop focal points and waterfront sites in Asakusa and Ryogoku will be <u>expanded to the upstream areas of the Sumida river.</u>

A bustling waterfront space

Expand projects centered on the Sumida river



Increase opportunities to use public open spaces, etc.

○ Relaxing the physical area requirements for utilizing public spaces will make it possible for <u>small-scale activities like open-air cafes and sales of goods to take place.</u>

Activities conducted in public open spaces (image)

Open-air cafes

Art exhibits

Use boats to diversify modes of transportation

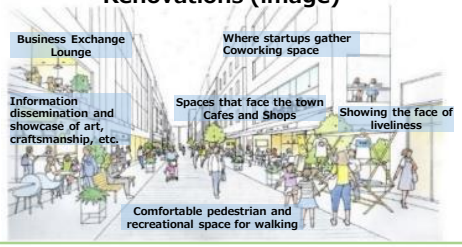
○ Consider and provide support for implementing boat transit routes, which will offer <u>new lifestyle options</u>, such as the ability to sit and do some work or to enjoy the scenery while commuting to the office by boat.

Transit by boat (image)

Promote the renovation of existing buildings (to upgrade functions)

○ Select areas for promoting renovation (Kanda is envisioned among others) and establish a mechanism to support the functional renovations of buildings (<u>effective use of building stock throughout the city).</u>

Renovations (image)



Chapter 4: Projects to Address Each Risks

3 Surviving a Tokyo metro area-wide complex disaster

■ For complex disasters, which can cause severe and prolonged damage, the project's approach is organized around pre-disaster and post-disaster **timelines**. Here, two specific examples are presented (**a major earthquake followed by a large typhoon,** and **infectious disease combined with flooding/storm or an earthquake**) to illustrate the measures and projects undertaken.

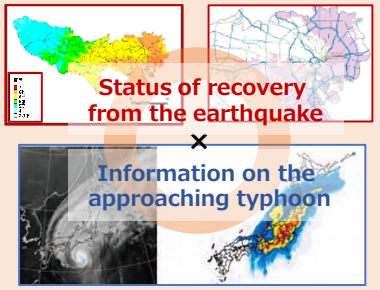
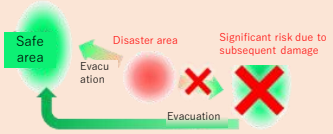
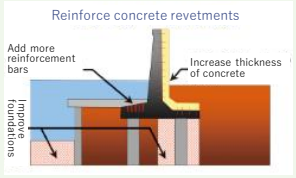
Example of efforts (major earthquake ➡ large typhoon)

Aim of the efforts

There is a risk of increased flooding from places where damage to seawalls, etc. was caused by a major earthquake, and people may not be able to stay in evacuation centers or in their homes. After accelerated forecasting and assessment of damage, it will be important to provide accurate guidance to safe evacuation sites by disseminating information on appropriate evacuation sites and routes, while also considering wide-area evacuation in accordance with the disaster situation.

Hard Infrastructure Measures

Soft Infrastructure Measures

Efforts for each crisis (reprint)	Assess damage	Disseminate information	Conduct evacuation
Develop evacuation sites in coordination with building on higher ground	**Quick forecasting and assessment of damage when a disaster strikes**	**Step up dissemination of information on evacuation sites and routes as necessary**	**Establish a system to support area-wide evacuation**
	**Enhance disaster information system functions**	**Disseminate information appropriate to the disaster situation**	**Consider area-wide evacuation**
Earthquake- and water-proofing of river facilities and coastal protection facilities		Disseminate adequate evacuation information 	 
			

Chapter 4: Projects to Address Each Risks

3 Surviving a Tokyo metro area-wide complex disaster

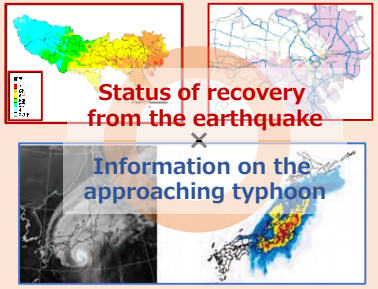
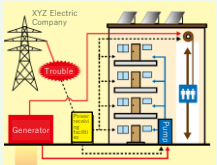
Example of efforts (infectious disease + flooding/storm or earthquake)

Aim of the efforts

If a large typhoon or an earthquake strikes in the midst of an epidemic, the risk of infection spreading at evacuation sites increases. Speeding up the forecasting and assessment of damage and disseminating information as necessary about crowding conditions at evacuation centers and which ones are open will help prevent concentration at particular evacuation centers. In addition, taking appropriate measures to prevent infection at evacuation centers will allow people who have no choice but to evacuate to shelters to stay there with peace of mind.

Hard Infrastructure Measures

Soft Infrastructure Measures

Efforts for each crisis (reprint)	Assess damage	Disseminate information	Conduct evacuation
Use various urban development programs, etc. to promote the installation of emergency generators	**Quick forecasting and assessment of damage when a disaster strikes**	**Further promotion of distributed evacuation in view of insufficient evacuation center capacity**	**Support self-support and mutual-support by Tokyo residents and businesses**
	**Enhance disaster information system functions**	**Disseminate information appropriate to the disaster situation**	**Promote measures to prevent infection in evacuation centers**
Popularize LCP homes, which are resilient in a disaster, and strengthen disaster prevention for apartment buildings (rapid restoration of elevators)		Disseminate adequate evacuation information 	**Flow from arriving at the evacuation center to reception (measures to prevent infection)** 
			

Chapter 5: Project Promotion

1 Concept for project promotion

（1）Steady promotion

<Implement projects in coordination with the “Future Tokyo: Tokyo’s Long-Term Strategy” >

○ This project will be **appropriately reflected in the new upgraded version of the “Future Tokyo” strategy to be formulated at the beginning of the new year**, with the progress of the respective projects understood and managed within the promotion of the strategy.

○ The “Basic Policy for Measures Against Heavy Rainfall” is scheduled to be revised and “River Facilities that Consider Climate Change” to be formulated in FY 2023, with the results to be **reflected in this project** in the same fiscal year.

<Strengthen execution capabilities for project promotion>

○ To ensure realization of the vision for Tokyo in the 2040s, it will be necessary to speed up project execution and strengthen the system for execution more than ever.

○ **Specific initiatives will be advanced to establish work order procedures and execution systems.**

Accelerate project execution

・Active use of multi-year contracting
・ Introduce ordering methods that can better utilize the technology and know-how of the private sector
・ Review how design estimation operations should be etc.

Strengthen the system for execution

・ Secure and train technical staff who will be needed to steadily implement the project
・ Make improvements to how the appeal of technical work is disseminated and diversify recruitment methods to secure technical staff
・ Allocate manpower from regular duties to duties related to key policies etc.

（2）Raise momentum for project promotion

○ **Proactively communicate the significance of the project and its contents** to develop a **shared sense of urgency** with Tokyo residents and businesses.

○ **Raise awareness** effectively to **further strengthen self-support, mutual support and public support.**

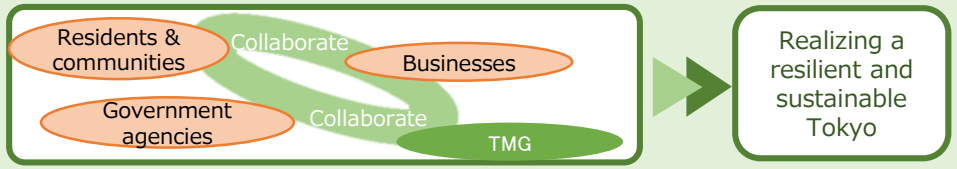
Tie in with the movement marking 100 years since the Great Kanto Earthquake

2 Effective project promotion measures

(1) Collaborating with diverse entities

○ Implement measures while working in close cooperation with diverse entities. These include measures addressing challenges that cross jurisdictions, measures tailored to local conditions, measures to encourage efforts by businesses, such as strengthening lifelines, and measures by Tokyo residents for self-support and mutual support

<Collaboration Model>



(2) Promoting DX

○ From the standpoint of maximizing the effectiveness of hard infrastructure preparations, initiatives for DX will be integrated to increase their synergistic effects.

<Examples of efforts>

Measures for floods and storms	Measures for earthquakes, etc.	Measures for volcanoes, etc.	Building a city also resilient to infectious diseases, etc.
Use state-of-the-art technology to recognize risk (simulation of flooding damage using digital twins)	Grasp the damage situation using drones and social media	Enhance and utilize the system for sharing disaster information (consolidate and share disaster information)	Become more resilient by collecting, analyzing, and disseminating data (using sensors and smart poles)

3 Disseminating information to Tokyo residents, etc.

○ In order to **minimize damage and keep people from panicking** when a disaster strikes, it is essential to **promptly and accurately share information** on evacuation and the actual state of damage and encourage people to behave calmly.

○ Provide information on disaster risks to residents, businesses, municipalities, etc. in advance, and **in the event of a disaster,** proactively **disseminate information in an integrated way and by utilizing digital technology.**

<Using the centennial of the Great Kanto Earthquake as an opportunity to roll out a movement>

100 Years Since
the Great Kanto Earthquake

Tokyo has survived through many disasters
Let's be prepared for tomorrow

Self-Support
Promote efforts among all generation to protect themselves

Mutual Support
Promote cooperation with municipalities, communities, and the private sector to improve disaster preparedness

Public Support
Promote understanding of urban development and building disaster-resilient communities

Symposium on the Great Kanto Earthquake for re-awareness of experiences 100 years ago


Comprehensive disaster drills befitting the centennial of the Great Kanto Earthquake


Visiting lectures on themes based on lessons learned from earthquake disasters, etc.


Strengthening cooperation with diverse entities, from neighborhood associations to companies and NPOs


Effective disaster preparedness drills using AR technology

Enhanced disaster preparedness content from the standpoint of diversity

Preparation of education materials for students


Restoration of Great Kanto Earthquake recovery parks

Creation of PR videos for the Great Kanto Earthquake archives


Enhancing awareness of the need to remove utility poles through urban development

Chapter 6: Project Scale

1 Rough estimate of the project's scale

○ The scale of future projects to achieve this project is as shown below.
○ In implementing individual projects, it will be necessary to promote highly effective measures while taking into account the estimated damage and the effects of the projects.

（1）Total project scale (rough estimate)

Total project scale (rough estimate)	next 10 years
JPY 15 Tn	6 Tn

*The project scale required to implement this project through the 2040s is shown.
*Some projects will be completed after the 2040s.

（2）Breakdown of project scale (rough estimates)

*Totals for each category do not add up to the grand total as some projects address more than one type of crisis.
*These figures represent the current scale of the project and may change in the future.

Category	Project scale breakdown (rough estimates)	next 10 years	Key projects
Protecting residents from increasingly severe **floods and storms**	**JPY 6.6 Tn**	2.0 Tn	・Further river upgrades (revetments, regulating reservoirs, etc.) ・Strengthening sewer system stormwater runoff measures ・Building communities on higher ground as urban infrastructure
Building a city that "does not collapse, does not burn, and people survive" even in the event of a **major earthquake**	**JPY 9.5 Tn**	3.7 Tn	・Projects for disaster response route networks, roads to serve as access routes, etc ・Building the earthquake resistance of quays ・Earthquake-proofing of water supply and sewer lines
Maintaining urban activities even if there is a **volcanic eruption**	**JPY 2.1 Tn**	0.6 Tn	・Ash fall countermeasures for water supply facilities ・Establishing a system for clearing roads in cooperation with the national government, municipalities, etc. ・Building waiting areas for boarding boats and parking lots needed for evacuation in response to volcanic eruptions
Eliminating concerns about **power, communications, and data** when a disaster strikes	**JPY 0.6 Tn**	0.6 Tn	・Supporting the introduction of PV systems and storage batteries, etc. ・Becoming a city that can serve as a model for a hydrogen society ・Efforts to upgrade the Wi-Fi environment throughout the city
Building a city that is **resilient to infectious diseases**	**JPY 0.6 Tn**	0.3 Tn	・Enhancing the convenience of areas around train stations and creating expansive spaces by seizing opportunities provided by urban development projects ・New development of metropolitan parks and marine parks based on user needs ・Building bicycle lanes