1. Further Improvements in Air Environment

2. Reduction of Environmental Risks Due to Chemical Substances

3. Improvements in Water/Thermal Environment
1. Further Improvements in Air Environment

Efforts and Challenges

**Air environment**

The air environment of Tokyo has been significantly improved as a result of our efforts on the diesel regulations and countermeasures for stationary sources, such as factories or workplaces.

Regarding the achievement rates for the environmental standards in FY2014 for nitrogen dioxide (NO$_2$) and suspended particulate matter (SPM), both were 100% at ambient air monitoring stations and the former was 97% and the latter was 100% at automotive emissions monitoring stations.

For photochemical oxidants, hours of high concentrations have decreased but the environmental standards have not been met at any stations. In 2015, there were 14 days on which photochemical smog advisories were given.

For PM2.5, the environmental standards were set by the national government in 2009.

PM2.5 concentrations in Tokyo decreased by approximately 55% in the 10 years from FY2001 but neither the 24-hour nor annual environmental standard have been met.

In recent years, concern over PM2.5 has been mounting on a global basis due to serious air pollution in China and other regions, generating the need for an urgent and effective response to it.

The Tokyo Metropolitan Government (TMG) is promoting countermeasures for causative agents, nitrogen oxide (NOX) and volatile organic compounds (VOCs), based on the TMG PM2.5 Review Report prepared in July 2011.

For PM2.5 and photochemical oxidants, it is necessary to enhance countermeasures for the sources of the causative agents, NOX and VOCs.
1. Further Improvements in Air Environment

» In the estimate of different sources’ rates of contribution to the concentration of PM2.5 in Tokyo, six prefectures in the Kanto region account for more than 30% while those outside of the region account for approximately 20%, which indicates the necessity of broad-based action.

■ Asbestos

» In Tokyo, demolition work on buildings constructed between 1956 and 2007 and possibly containing asbestos has hit a peak and is expected to remain at the same level until around 2050.

» Anti-dispersion measures for asbestos have been strengthened since June 2013 when the revised Air Pollution Control Act was put in force. In response to the revision, TMG applied a similar revision to the Tokyo Metropolitan Environmental Security Ordinance and made other revisions to require builders to keep a record of the result of monitoring the dispersion of asbestos and the contents of work.

» In Tokyo, unauthorized construction may sometimes be reported from citizens or revealed by on-site inspections of demolition work sites of buildings with asbestos-containing materials.

■ Noise and vibration

» Noise and vibration can often become a problem in Tokyo as it is densely populated and has many areas that are a mix of residential and industrial use.

» Through the 1980s, there were a number of complaints about noise associated with factories or workplaces. However, since then there have been many complaints about noise caused by construction work, a trend which has been increasing in recent years.

» There have been improvements in the achievement rates for the environmental standards for areas facing roads or those for noise from the Shinkansen Superexpress Railway. However, continuous measures are needed for these types of noise as it greatly depends on traffic volumes, the maintenance of equipment, and other conditions.

Sources’ estimated contribution to PM2.5 concentration in Tokyo in FY2008

Achievements of environmental standards for noise

<table>
<thead>
<tr>
<th></th>
<th>Roads¹</th>
<th>Shinkansen²</th>
<th>Aircraft³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daytime</td>
<td>Night-time</td>
<td>Night-time noise guidelines in residential areas</td>
</tr>
<tr>
<td>FY2006</td>
<td>88%</td>
<td>77%</td>
<td>87%</td>
</tr>
<tr>
<td>FY2013</td>
<td>95%</td>
<td>89%</td>
<td>93%</td>
</tr>
</tbody>
</table>

¹ Environmental Quality Standards for Noise in Japan at the Areas Facing Roads
² Environmental Quality Standards for Shinkansen Superexpress Railway Noise
³ Environmental Quality Standards for Aircraft Noise
⁴ For the Atsugi Airfield, the values for FY2006 and FY2013 cannot be directly compared as they are based on different designated lots.
1. Further Improvements in Air Environment

Tokyo in the Future
An excellent air environment has been realized giving Tokyo a high ranking compared to other major cities in the world.

- The concentrations of PM2.5 and photochemical oxidants have been significantly reduced to realize a comfortable air environment.
- Issues of noise or vibration have been remarkably mitigated to make the lives of Tokyo residents more comfortable.

Targets
- Increase the achievement rate for the PM2.5 environmental standards to 100% by FY2024.
- Ensure zero days with photochemical smog advisories by FY2020.
- Reduce the concentration of photochemical oxidant to 0.07 ppm or less at all monitoring stations by FY2030 (* annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years).
- Promote effective measures to reduce noise from construction sites.

Description of setting targets for photochemical oxidant concentrations

- More than 40 years have passed since 1973 when the environmental standard of 0.06 ppm or less as a one-hour value was set. However, the standard has not been met at any stations in Tokyo with the maximum one-hour value from April to December 2015 being 0.19 ppm.
- For the early reduction of photochemical oxidant concentrations to achieve the environmental standard or final target, TMG has set, for the first time as a Japanese municipality, an intermediate target with a specific year by referring to eight-hour values used worldwide.
- To set the intermediate target, TMG referred to the American standards established according to the result of collecting and analyzing the latest scientific findings.

Comparison between principal environmental standards of international organizations or other countries and intermediate target of TMG

<table>
<thead>
<tr>
<th>Concentration (ppm)</th>
<th>X-Hour concentration</th>
<th>Year of setting</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate target of TMG</td>
<td>0.07</td>
<td>8-hour concentration</td>
<td>2016</td>
</tr>
<tr>
<td>Environmental standard of Japan</td>
<td>0.06</td>
<td>1-hour concentration</td>
<td>1973</td>
</tr>
<tr>
<td>WHO guideline</td>
<td>0.05</td>
<td>8-hour concentration</td>
<td>2005</td>
</tr>
<tr>
<td>US standard</td>
<td>0.07</td>
<td>8-hour concentration</td>
<td>2015</td>
</tr>
<tr>
<td>EU target</td>
<td>0.06</td>
<td>8-hour concentration</td>
<td>2002</td>
</tr>
</tbody>
</table>

- The WHO guideline value is equivalent to the environmental standard value of Japan, which is the final target.
- The US standard is stricter than the EU target.
- If achieved, the US standard is believed to help mitigate health effects, such as a decline in lung function, and reduce hospitalizations, emergency hospital visits, and the risk of death.
Policy Directions

(1) Promotion of countermeasures for PM2.5 and photochemical oxidants

To promote countermeasures for PM2.5 and photochemical oxidants, TMG will take finely-tuned measures for various sources and develop broad-based cooperation with surrounding local governments. It is important to continue studies on unexplained issues, such as the formation of PM2.5 and photochemical oxidants. TMG will also consider emissions control measures for NOX and VOCs focusing on days with high-concentration photochemical oxidants.

- Regulation and guidance for factories or workplaces and broader spread of certified appliances

For factories or workplaces in Tokyo, TMG has tightened regulation and guidance for substances for which emission standards have been stipulated, including soot and smoke, by giving guidance on notifications according to laws and regulations, examining the notification details, and conducting on-site inspections as required. As measures for small boilers etc. not subject to regulation by law, TMG has certified those meeting TMG’s criteria as “low-NOx and low-CO\textsubscript{2} small combustion appliances.” TMG will be committed to continuing regulation and guidance and encourage the broader spread of certified appliances.

- Technical support for businesses

Stationary evaporation sources account for approximately 60% of VOC emissions in Tokyo and most of them are small and medium-sized facilities. To encourage efforts by these businesses for voluntary emissions control and enable them to take effective measures, TMG will continue technical support, including holding various seminars, distribution of technical guides by industry type, and the dispatching of advisors whose function will be to recommend control measures matching actual conditions at facilities.

- Effective use of Appropriate Control System of Chemical Substances

TMG will strive to further reduce VOC emissions from the industrial sector by using its Appropriate Control System of Chemical Substances and other systems to consider reduction approaches according to the status quo and VOC use at businesses.
1. Further Improvements in Air Environment

- **Expanded use of next-generation vehicles**
  Low-emission vehicles and fuel-efficient vehicles have been developed and spread as TMG has required businesses to introduce specified low-emission and fuel-efficient vehicles and encouraged the use of them. As a result, the number of low-emission vehicles and fuel-efficient vehicles has increased to account for approximately 20% of the total number of automobiles owned in Tokyo. TMG will strive for the expanded use of automobiles with high environmental performance by supporting the introduction of next-generation vehicles.

- **Monitoring system for automotive emissions**
  As the result of research and study, the Tokyo Metropolitan Research Institute for Environmental Protection has found automobiles with a defeat device that enables them to meet the NOx emissions standards in automotive emission testing by the national government in spite of their emissions actually being several-fold the limit during on-road driving. TMG will build an effective monitoring system to prevent such malicious violation.

- **Measures for gasoline evaporative emissions**
  Gasoline evaporative emissions are VOCs that are released in the air during fueling, parking, and driving. Controlling the emissions will likely achieve further improvements in the air environment. Through the cooperation in the framework of the nine local governments coalition in the Kanto district, TMG will reduce VOC emissions from automobiles by requesting the national government to introduce ORVR vehicles as they are appropriate countermeasures for gasoline evaporative emissions.

- **Measures for vessels**
  TMG will need to flexibly respond to the tightening of legal restrictions on exhaust gas from vessels, such as a stricter upper limit for the sulfur concentration in fuel oil (3.5% to 0.5% by 2020 or 2025) in the International Convention for the Prevention of Pollution from Ships (MARPOL). For further reduction of NOx and sulfur oxide (SOx) emissions in the Port of Tokyo, we will be committed to encouraging vessels with low environmental load to call at the port using incentives based on ESI, an international environmental program.

- **Reducing emissions from combustion appliances in commercial and residential sectors**
  The commercial and residential sectors’ rates of contribution to the concentration of PM2.5 are not high on the whole but still
account for approximately 10% of human-related emissions in Tokyo. TMG will promote the reduction in NOx emissions by investigating actual conditions of exhaust gas from the many non-regulated small appliances in the sectors and applying the Certification Program for Small Combustion Appliances with Low NOx/CO2 to a broader range of appliances.

**Measures for VOCs in intimate living environment**

VOCs from general households and offices amount to approximately 10,000 tonnes a year accounting for approximately 16% of VOC emissions in Tokyo (estimate for FY2010). Though air pollutants, including PM2.5, have drawn increasing attention recently, emissions control measures for their causative agents, VOCs, are not very widely spread in the intimate living environment. Therefore, TMG will encourage low VOC products to be selected as familiar housewares.

**NOx and VOC emissions control on days with high-concentration photochemical oxidants**

In Tokyo, days with photochemical smog advisories cannot be completely eliminated partly because of climate conditions, including the frequent occurrence of extremely hot days with high levels of insolation. Therefore, we need to cooperate with businesses in a more flexible manner to pursue effective control measures that have a minimal negative impact on their operations. TMG will consider a new mechanism that enables effective handling of photochemical smog forecasts and requests to businesses for emissions control.

**Promotion of broad-based cooperation**

TMG has implemented measures to encourage VOC-discharging businesses in emissions control during summer through the cooperation in the framework of the nine local governments coalition in the Kanto district and will additionally carry out measures for combustion appliances mainly in winter. We will develop other broad-based measures, such as the promotion of the wider spread of low-NOx and low-CO2 small combustion appliances certified by TMG in tandem with green purchasing by municipalities.

For large-scale development plans, TMG will work with surrounding local governments to request consideration before and after the plans as the widespread impact of air pollutants, including PM2.5, is expected with such plans.
I. Formulation of New Tokyo Environmental Master Plan

II. Directions of Future Environmental Policies

III. Ensuring Promotion of the Plan

1. Further Improvements in Air Environment

- **Constant air monitoring**
  At 82 locations in Tokyo, consisting of 47 ambient air monitoring stations and 35 automotive emissions monitoring stations, 24-hour continuous monitoring is conducted for not only the six items specified by the environmental standards—NO₂, SPM, photochemical oxidants, sulfur dioxide, carbon monoxide, and PM2.5—but also seven other items—nitric oxide, methane, non-methane hydrocarbon, wind direction, wind speed, temperature, and humidity. TMG will build Super Sites® for more detailed monitoring and identifying air environment conditions. We will provide comprehensible information to Tokyo residents and visitors to the city through the air pollution map that shows hourly measurements.

- **Studies on countermeasures for PM2.5 and photochemical oxidants**
  On days with high-concentration PM2.5, the component composition depends on seasons and places. Therefore, TMG will analyze seasonal primary causes, identify the influence of large-scale transport, and examine data-driven effective reduction methods.
  TMG will research plant-related VOCs as it is becoming clear that plants emit VOCs greatly affecting the generation of photochemical oxidants but actual conditions, such as the amount generated in urban areas, have not been identified yet. We will reorganize a source inventory® and use it to consider future measures, including unidentified fields.

(2) **Enforcement of anti-dispersion measures for asbestos**

To enforce the anti-dispersion measures for asbestos, TMG will share notified information, conduct on-site inspection, and publicize the necessary information to businesses in cooperation with the Tokyo Labor Bureau as it strives to ensure the safety of construction workers. We will also strengthen technical support for asbestos analysis by municipalities.

![Air pollution map (NO₂)](image)

![PM2.5 sampler](image)

![Asbestos removal](image)
(3) Measures for noise and vibration

TMG will survey noise and vibration for the implementation of effective measures and support municipalities’ efforts to reduce complaints about construction noise, which has been on the rise in recent years.

- **Measures for automobile noise**
  
  To prevent automobile noise, comprehensive measures need to be promoted, including the reduction of noise from automobiles etc., noise-reducing road surfacing, and dispersion of automobile traffic volumes. Therefore, in parallel with the construction and renovation of urban infrastructure, we will continue reducing automobile noise through the adoption of two-layer low noise pavements highly effective in suppressing automobile noise and the enhancement of road networks to disperse automobile traffic volumes. We will also promote the introduction of next-generation vehicles that help reduce noise as well.

- **Measures for aircraft noise**
  
  TMG measures noise around the Tokyo International Airport (Haneda), Yokota Air Base, and Naval Air Facility Atsugi. Since several research points around the Yokota Air Base and Naval Air Facility Atsugi do not meet the environmental standards, we will request the national government etc. to promote the aircraft noise prevention measures and expand areas eligible for soundproofing of residential buildings and facilities that qualify for subsidy.

- **Measures for railway noise**
  
  Although the achievement rates for the environmental standards for noise have been greatly improved in recent years, several research points did not meet the standards in FY2013. To improve these points, TMG will request from businesses effective noise reduction measures suitable for the causes of noise, such as the installation of noise barriers and introduction of railcars that produce lower levels of noise, which will be determined with measurement surveys, including the identification of noise sources.

- **Reduction of complaints about daily life noise and vibration**
  
  Many of the complaints about noise and vibration in Tokyo are attributable to construction or demolition work of roads and buildings. To ensure a comfortable living environment for citizens, TMG will consider solutions to reduce complaints and continue technical support for municipalities, including the holding of training courses on monitoring and provision of technical advice.
2. Reduction of Environmental Risks Due to Chemical Substances

Efforts and Challenges

- **Measures for chemical substances**
  - Based on the ordinance in FY2014, the total amount of chemical substances emissions from factories etc. in Tokyo was reduced to approximately 40% of the levels recorded 10 years ago. However, it is necessary to check for risks caused by non-regulated chemical substances as there are many areas that have a mix of residential buildings and workplaces in Tokyo.
  - In a research in FY2014, the concentrations of dioxins met the environmental standards at all measuring points in air, soil, and groundwater. The concentration in the air was approximately 1/15 compared to FY1998, decreasing to approximately 1/25 of the environmental standards. The concentration in sediments exceeded the environmental standards at one point in rivers, and so needs ongoing monitoring.
  - TMG revised the Chemical Substance Control Guidelines stimulated by the Great East Japan Earthquake and requests businesses to report the response to earthquakes in order to prevent leakage or effluence accidents of chemical substances in the event of earthquakes.

- **Measures for soil pollution**
  - To prevent an impact from soil pollution on human health caused by the closure of factories or redevelopment works, since FY2001 TMG has required businesses dealing with hazardous substances and those who significantly modify land to conduct soil pollution research and take appropriate measures if pollution is found.
  - In soil pollution research conducted at the time of the closure of factories, soil pollution was found in approximately 35% of roughly 3,300 notifications. In the research conducted at the time of significant land modification, a possibility of soil pollution was found in approximately 30% of roughly 7,200 notifications (as of the end of March 2015).
  - In areas where soil pollution has been identified, measures need to be taken to prevent an impact on human health. However, small and medium-sized businesses have challenges in terms of cost and technologies.
  - TMG provides effective technical support to small and medium-sized businesses through the effective use of Soil Pollution Countermeasures Guidelines for Small-and-Medium-sized Companies that contains an easy-to-understand description of rational measures and techniques as well as the dispatch of Soil Pollution Control Advisors who give advice on technical matters.
Tokyo in the Future

Environmental risks due to chemical substances are reduced to ensure a safe living environment.

- Emission of chemical substances is restricted to further reduce environmental risks.
- Rational countermeasures for soil pollution are selected for further processing.

Targets

- Further reduce chemical substances emissions into the environment.
- Promote countermeasures for soil pollution considering environmental, economic, and social aspects.

Policy Directions

(1) Promotion of reduction measures for chemical substances emissions

Although chemical substances emissions in Tokyo have steadily decreased, it is necessary to understand the situation and check for risks in areas with mixed residential and industrial use as there are a relatively large number of such areas in Tokyo.

Enhancement of Appropriate Control System of Chemical Substances

In addition to the PRTR system of the national government, TMG requests small facilities to report emissions into the environment of chemical substances subject to proper control as specified in the ordinance. We will use these systems to consider measures to further reduce chemical substances emissions.

(2) Promotion of countermeasures for soil pollution

TMG will be committed to promoting improvement measures as soil pollution is highly accumulative, closely associated with groundwater pollution, and influential for a long period of time. To promote rational countermeasures for soil pollution taking into consideration the risks to human health, we will propose and request that the national government re-examine legal restrictions. Depending on the outcome, we will also appropriately address our systems based on the ordinance.

Technical support for small and medium-sized businesses

To enable small and medium-sized businesses to promote research and measures with low cost and low environmental load, TMG will continue support for them by dispatching advisors or by other means.

Examination of approaches for selecting optimum countermeasures for soil pollution

In light of low environmental load (environmental aspect), cost reduction (economic aspect), and better understanding of neighborhood residents (social aspect) in all processes related to the implementation of the measures, TMG will examine approaches to encourage the selection of the rational measures by businesses.
3. Improvements in Water/Thermal Environment

Efforts and Challenges

- **Water quality of rivers and Tokyo Bay**
  - In FY2014, BOD<sup>94</sup> of rivers met the environmental standards in all of 56 water areas in Tokyo.
  - COD<sup>95</sup> of Tokyo Inner Bay (water areas bordering Tokyo ranging from the mouth of the Tama River to that of the Old Edo River) met the environmental standards in only one water area out of four, causing red tides and hypoxic water mass<sup>96</sup> to affect aquatic organisms particularly in summer.
  - In the case of heavy rains in particular, “wastewater discharge under wet weather” is carried out to protect urban areas from floods, which is one of the causes of deteriorated water quality in Tokyo Bay. As to prefectures’ percentages in discharged load in terms of COD flowing into Tokyo Bay, more than 70% comes from prefectures other than Tokyo. This represents the importance of broad-based measures in cooperation with the national government, other prefectures, and relevant organizations.

- **Situation of water cycle in Tokyo**
  - Water cycle has changed in recent years as a result of further urbanization, changes in industry structure, and climate change, which requires an urgent response to various challenges: groundwater recharge, a decrease in river flow, floods, water pollution, and impact on ecosystem.
  - For the ground and groundwater in Tokyo, land subsidence is calming down as groundwater pumping has been regulated by laws and ordinances. Groundwater levels are recovering as a whole but the recovery has stagnated in recent years, causing concern over the recurrence of land subsidence due to the lowered levels in several regions.
  - Land subsidence is an irreversible phenomenon where the original ground height does not recover. Since excess pumping may worsen the situation, TMG needs to continue striving to prevent land subsidence through appropriate regulation of pumping.
  - On the other hand, there is a growing interest in the use of groundwater as seen in the fact that emergency water wells were drilled as stimulated by the Great East Japan Earthquake. The Basic Act on the Water Cycle enacted by the national government in April 2014 shows an attitude of promoting the conservation and sustainable use of groundwater.
  - With a view to these new challenges, it is necessary to promote initiatives that help maintain a sound water cycle.
Increased risk to water and human health due to climate change

In June 2014, TMG revised the Tokyo Metropolitan Torrential Rain Measures Basic Policy to enhance countermeasures for flood in watersheds and districts for intensified measures, including response to be made when rainfall reaches 75 ml/hour in the 23 wards and 65 ml/hour in the Tama area.

Climate Change and Its Impacts in Japan (2012 edition) of the national government indicates the possibility of different impacts in connection with a rise in average temperatures in Japan, such as more serious disasters due to heavy rainfall, increased risk of tidal waves, higher incidence of heatstroke, and the expanded habitat of infection-bearing mosquitoes.

It will be necessary to make efforts in the mitigation of the risk of damage from landslide disasters and tidal waves and the prevention of heatstroke and infection in addition to response to torrential rain.

Thermal environment in Tokyo

The annual average temperature of Tokyo has risen by approximately 3°C in the last 100 years. Far exceeding 1.5°C of cities located in regions less influenced by urbanization, the rise clearly shows the trend of high temperatures in cities, including the heat island effect, as well as the impact of global warming.

The number of sweltering nights has increased since the 1970s, leading to 5-year moving average in 2011 being 42.6 days at a record level. The number of people transported by ambulance due to heatstroke increased from 412 in 2000 to 4,634 in 2015.

In addition to its own efforts in energy efficiency, TMG has developed a broad range of measures: laying heat blocking pavements and water retaining pavements; greening along rivers; restoring roadside trees; developing parks and squares; the greening of walls and building rooftops; water sprinkling; and planting lawn in schoolyards.

The verification of the measures effects using thermal images shows that thermal infrared radiation from the ground surface in redevelopment zones has steadily decreased from that measured before the development while the radiation tends to remain high in dense residential areas.

Since the trend of high temperatures in cities has continued partly because of the impact of climate change, it will be necessary to implement measures to control the temperature rise and adaptation measures focusing on the control of the impact of an increase in the occurrence of heat stress.
Tokyo in the Future

An environment in which Tokyo residents and visitors to the city feel comfortable has been realized as a result of the improved water quality of rivers and marine areas, along with the creation of a luxuriant water environment, with measures for the heat in place.

- The water quality of rivers and marine areas is improved; and citizens have become familiar with a waterfront environment that hosts a variety of aquatic organisms.
- Spring water and groundwater are conserved; and maintenance and safety have been improved in an attractive environment that takes full advantage of the waterfront.
- Measures for the heat are in place to allow people to feel comfortable in town.

Targets

- Increase the achievement rate for the marine area COD environmental standards to 100% by FY2020 and maintain the achievement rate of 100% for the river BOD environmental standards.
- Formulate management measures that are well balanced in terms of the conservation and proper use of groundwater.
- Increase areas that mitigate the midsummer heat felt by people.

Policy Directions

(1) Measures for water pollution

In cooperation with the national government and relevant local governments, TMG will further promote measures for water pollution in Tokyo Bay and rivers to develop a familiar and friendly waterfront environment.

- Ensured implementation of total emissions control of effluents

TMG regulates the concentrations of hazardous substances in effluent according to the Water Pollution Control Law. For COD, nitrogen, and phosphorus, TMG regulates the total emissions as well. Based on the Tokyo Metropolitan Environmental Security Ordinance, we formulate effluent standards that are stricter than the Law requires and regulate items and facilities not subject to the Law. We are committed to implementing regulations based on laws and ordinances and considering and promoting effective measures in cooperation with the national government and relevant local governments.

Overview of effluent control

<table>
<thead>
<tr>
<th>Control of concentrations</th>
<th>Total emissions control of effluents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation contents</td>
<td>Regulates absolute amount of substances in effluent</td>
</tr>
<tr>
<td>Applicable areas</td>
<td>Areas through which effluent flows into Tokyo Bay</td>
</tr>
<tr>
<td>Size of applicable workplaces</td>
<td>Daily average effluent of 50 m³ or more</td>
</tr>
<tr>
<td>Applicable substances</td>
<td>Hazardous substances Living environment items</td>
</tr>
</tbody>
</table>

Part of living environment items:
- COD (from FY1979)
- All nitrogens (from FY2002)
- All phosphoruses (from FY2002)
III. Ensuring Promotion of the Plan

II. Directions of Future Environmental Policies

1. Formulation of New Tokyo Environmental Master Plan

(a) Restoration of water cycle and improvements in the waterfront environment in Tokyo

TMG will aim for a restored water cycle and improved waterfront environment that are relevant to Tokyo taking into account the impact of climate change while tackling the conservation and properly controlled use of groundwater and the conservation and recovery of spring water. In addition, we will need to develop the waterfront environment in coastal areas as a more attractive space taking advantage of the holding of the Tokyo 2020 Games.

- Conservation and properly controlled use of groundwater

In light of recent changes in the situation surrounding groundwater, TMG will examine management measures to balance conservation with proper use by identifying the actual conditions of ground water. As hot springs are a particular form of groundwater use, we will continue the verification in connection with groundwater.

- Conservation and recovery of spring water

Spring water acts as a river source as well as a place where living things are grown and local community is formed. It has further potential as a valuable resource, as it can also be a resource for tourism. As efforts toward the conservation and recovery of spring water, TMG will continue the conservation of green spaces and forest that play an important role for groundwater recharge and the promotion of rainwater infiltration.

- Improvements in combined sewer system and implementation of dredging

TMG will promote the improvements in the combined sewer system\(^2\), including the construction of storage facilities and high-speed filtering facilities, to further reduce pollution loading that flows out in wet weather. By constructing advanced treatment facilities at water reclamation centers, TMG will improve the quality of water discharged to the waterfront, making a contribution to the control of red tides in Tokyo Bay. In river segments and canals with low levels of water flow, we will implement measures, including dredging and sand capping\(^3\), to prevent deteriorated water quality or noxious odors due to the elution of nitrogen or phosphorus from mud deposits.

- Research and study of water quality and aquatic organisms

TMG will strive to keep the habitat of aquatic organisms in good condition and improve the water quality of Tokyo Bay through the effective use of monitoring data for efforts in water purification in cooperation with the national government and relevant local governments and the accumulation of findings on water purification by investigating the actual conditions of the elution of nutritional salts from sediments and studying the purification mechanism of the ecosystem in shallow water and tidelands.

(2) Restoration of water cycle and improvements in the waterfront environment in Tokyo

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3. Improvements in Water/Thermal Environment

- **Improvements in waterfront environment**
  TMG will strive to improve the waterfront environment in Tokyo by cooperating with or supporting businesses developing the waterfront environment, including the promotion of greenery with flowers and plants and municipalities conserving ecosystems along the waterfront, including spring water and waterways, and by continuing efforts in the restoration of clear streams and improvements in the water quality of the moat in the outer garden of the Imperial Palace.

  We will also promote efforts taking advantage of the attractions of waterways, including areas along the Sumida River and coastal areas, and create a variety of enticements and attractions along waterfront spaces.

- **Promotion of disaster countermeasures, including improved safety of rivers etc.**
  Based on the revised Tokyo Metropolitan Torrential Rain Measures Basic Policy, TMG will implement comprehensive measures to reduce flood damage, such as watershed measures, including the installation of infiltration inlets, and the maintenance of rivers and sewer systems. TMG will also need to enhance non-structural measures as the construction of facilities takes a long time. We will promote countermeasures for flooding in large underground malls and strengthen the provision of real-time information to Tokyo residents by improving the functions in a flood forecasting system and introducing it into the latest radar, Tokyo Amesh.

  Moreover, TMG will construct erosion control facilities, including erosion control dams and grating crib works, to prevent landslide disasters caused by typhoons and torrential rain, promote the construction of super levees and develop waterproofing measures for seawalls and their inner walls in order to prevent flood damage due to tidal waves.

### Watershed measures (image)

- Clear stream restored in Tamagawajosui headrace
- Illustrated scheme of measures against torrential rain for rivers
- Measures against torrential rain in sewer system: 2nd Tameike Sewer Trunk Line with 8.0-m inner diameter
(3) Promotion of measures against heat in town

TMG will aim for an even more comfortable urban environment by developing measures for the heat, such as the creation of cool spots in town. Looking ahead to the Tokyo 2020 Games, we will strengthen measures for the heat at arenas and in town. Since temperature rises may increase the risk of the occurrence of infection in the future, we will also make efforts in preventing infection.

Encouragement of efforts by municipalities and private businesses

In cooperation with various participants, such as municipalities and businesses, TMG will create cool spots by installing dry-type mist generation equipment and maintaining flowers and plants at different places in Tokyo in addition to the existing measures for heat island effects. We will further encourage efforts by various participants through the revision of the Guidelines for Heat Island Control Measures.

Enhanced cooperation with the Organising Committee and relevant ministries and agencies for holding the Tokyo 2020 Games

Toward the holding of the Tokyo 2020 Games, TMG will promote the construction of heat blocking pavements as heat control measures for roads, including the marathon course. We will implement public relations for the prevention of heatstroke and have measures for the heat spread in society, adopting efforts in non-structural aspects, such as the expansion of efforts in water sprinkling in cooperation with communities.

Implementation of countermeasures to infectious diseases

As to mosquito-borne infections, TMG will build a context-sensitive, comprehensive response system by working with the national government, relevant organizations, and citizens, which enables TMG to control the occurrence of mosquitoes at ordinary times, conduct surveillance of the inhabitation status of virus carrying mosquitoes and occurrence of patients, and quickly carry out research at the time of the occurrence as well as the extermination of mosquitoes.