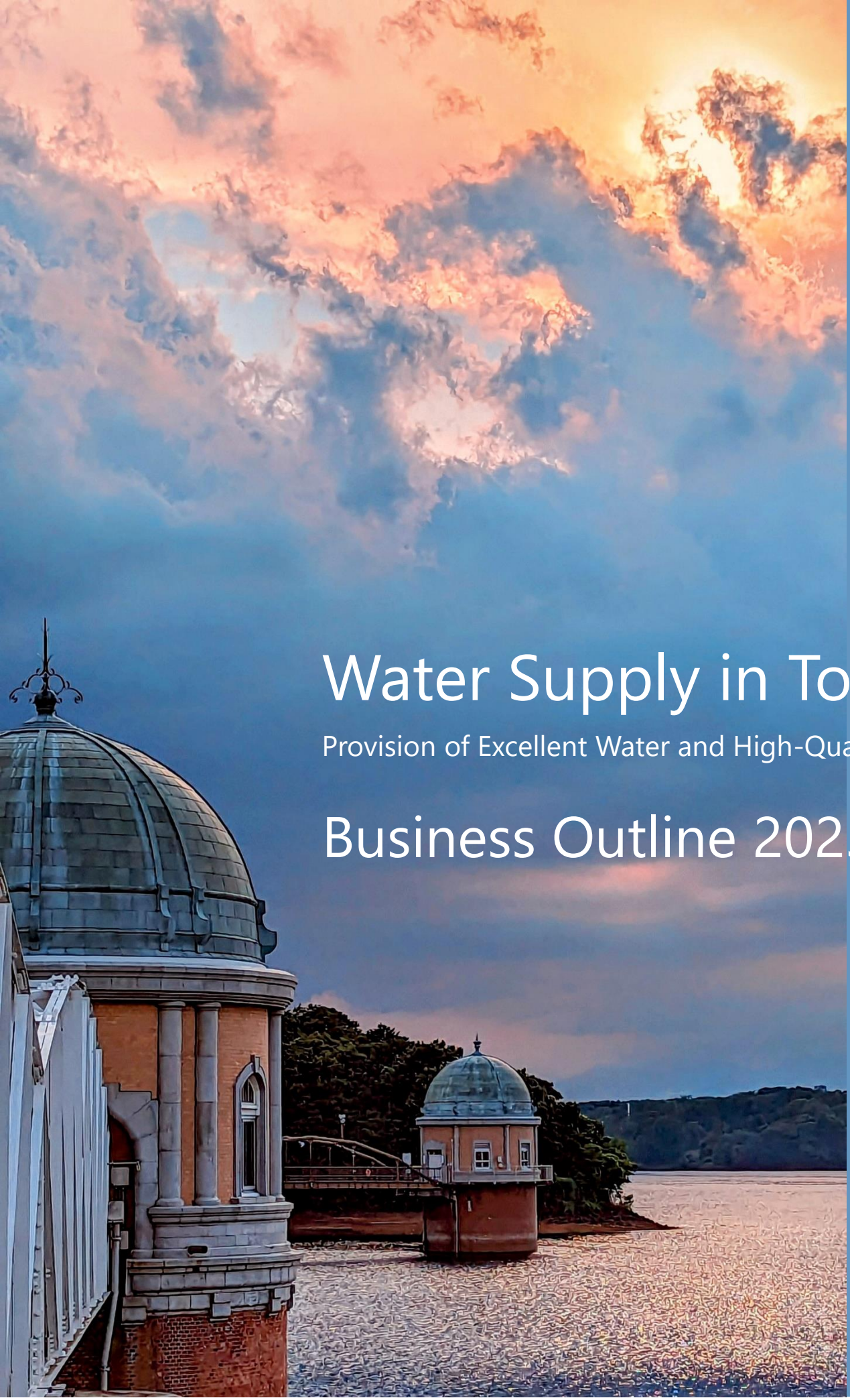


Water Supply in Tokyo

Provision of Excellent Water and High-Quality Service

Business Outline 2023

Bureau of Waterworks
Tokyo Metropolitan Government

Tokyo Waterworks Supports the Capital of Japan

Tokyo, the capital of Japan, is the largest city in the country with a population of about 14.04 million, which is about 10% of the country's entire population (as of January 1, 2023). Tokyo is not only a political and economic center where national political functions and large corporations are concentrated, but also an important global city. The Bureau of Waterworks, Tokyo Metropolitan Government (hereinafter referred to as "Tokyo Waterworks Bureau") provides fine and efficient water supply operation to ensure a stable water supply and has a total facility capacity of about 6.84 million ㎥ per day to support the lives of people and all urban functions.

We supply water to
13,695,575 people
As of Oct 1, 2022

We distribute water a total of
1,516,654 × 1,000 ㎥/year
As of FY2022

Water Supply Operation Center

The water supply system in Tokyo is massive and complex, consisting of intake facilities, purification plants, water supply stations, transmission and distribution pipes, etc. In order to accurately grasp the operation status of such system, the Water Supply Operation Center constantly monitors water supply for 24 hours by collecting and processing various data on the status from the water resources through distribution pipes, using the water supply operation system.

Water Supply Operation Center

Purification Plants of Tokyo Waterworks Bureau

As *of* March 31, 2023

River System	Purification Plant	Plant Capacity (m^3 per day)	Treatment Method
Tone/Arakawa River Systems	Kanamachi	1,500,000	Rapid sand filtration / Advanced water treatment (fully used) 1,500,000 ㎥/day
	Misato	1,100,000	Rapid sand filtration / Advanced water treatment (fully used) 1,100,000 ㎥/day
	Asaka	1,700,000	Rapid sand filtration / Advanced water treatment (fully used) 1,700,000 ㎥/day
	Misono	300,000	Rapid sand filtration / Advanced water treatment (fully used) 300,000 ㎥/day
	Higashi-murayama	880,000	Rapid sand filtration / Advanced water treatment (Tone/Arakawa River systems 880,000 ㎥/day)
Tama River System		385,000	
	Ozaku	280,000	Rapid sand filtration
	Sakai	315,000	Slow sand filtration
	Kinuta	114,500	Membrane filtration / Slow sand filtration
	Kinutashimo	70,000	Membrane filtration / Slow sand filtration
Sagami River System	Nagasawa	200,000	Rapid sand filtration
Total		6,844,500	-

Tokyo Water, the Highest Quality

Japan is one of the few countries where tap water is drinkable. Tokyo Waterworks Bureau is pursuing the world's highest level of safety and pureness through various efforts.

Water Quality Target for Pure and High Quality Water

We have set our own water quality target for pure and high quality water, which is stricter than the levels of the national water quality standard, etc., with the aim of improving customer safety and trust.

TOKYO High Quality Management Program (The Tokyo version of the Water Safety Plan)

The TOKYO High Quality Management Program (the Tokyo version of the Water Safety Plan) determines comprehensive water quality control measure that controls and manages water through (1) the Water Safety Plan, a water quality management method for risk management from water resources to taps, (2) the quality control method according to ISO 9001 at the purification plants and (3) ISO/IEC 17025, which certifies the reliability of water examination. By steadily operating this program while enhancing it based on the latest findings and research studies, we will strive to achieve a higher level of safety and pureness and further improve the trust in tap water.

Thorough Water Quality Management

In order to supply safe and pure water, the water quality is meticulously controlled from the water resource to the tap as follows.

- Regular examination of water quality at water resources
- Water quality examination for appropriate water treatment at purification plants
- Continuous monitoring using automatic water quality meters and regular detailed examinations at 131 water taps in Tokyo

Basic data of Tokyo Waterworks

Service area	1,239.23 ㎢
Population served	13,695,575 people
Pervasion	100 %
Number of service connections	7,909,895 cases
Total length of distribution pipes	27,466 km
Total capacity of facilities	6,844,500 ㎥ / day
Total distribution amount per year	1,516,654 × 1,000 ㎥
Maximum distribution amount per day	4,503,500 × 1,000 ㎥

Management of the Water Conservation Forest

Tokyo Waterworks Bureau has been managing 25,183 ha of the water conservation forest in the upper reaches of the Tama River for about 120 years in order to assure a stable river flow in the Tama River water resource area and to conserve the Ogouchi Reservoir (Lake Okutama), which is Tokyo's own water resource. We have developed new management plans for the water conservation forest almost every 10 years and have managed the forests according to these plans.
We are working on the water conservation forest management in the following systems.

- Maintenance and management of the water conservation forest
- Prevention and recovery from mountain disasters
- Improvements in forest management infrastructure
- Restoration of private forests
- Communications with communities through water resources
- Contribution to environmental conservation

Water Conservation Forest

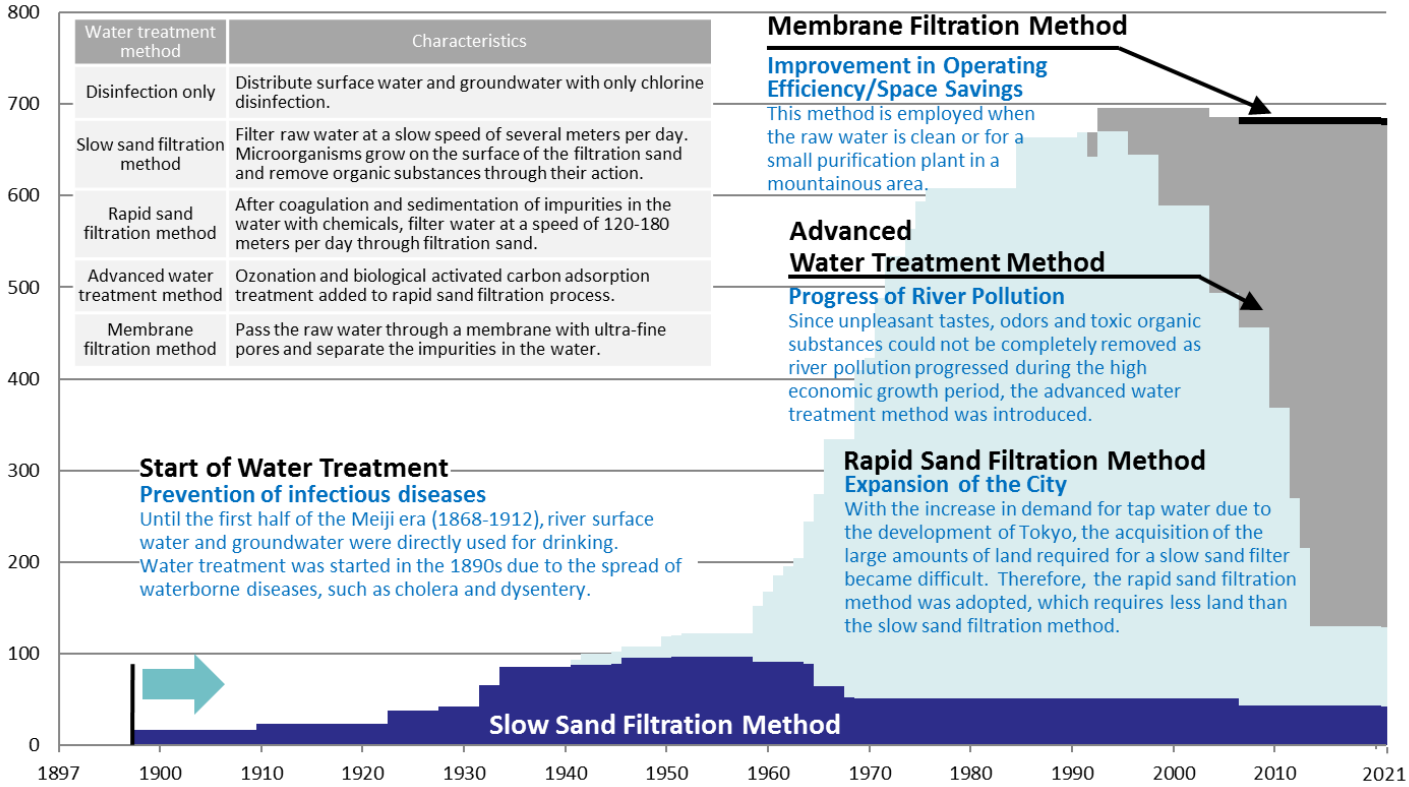
Ogouchi Reservoir

Water Conservation Forest Tour

Voluntary Activities for Forest Protection

History of Water Treatment Method in Tokyo

Tokyo Waterworks Bureau takes raw water from various resources including surface water from reservoirs and rivers, subsoil water and groundwater, and performs water treatment appropriate for each raw water quality.

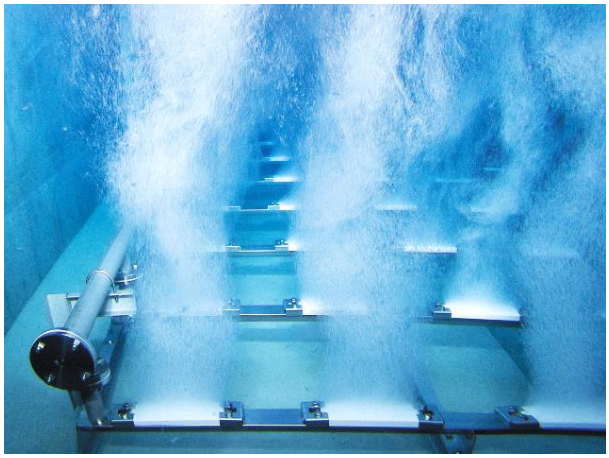


Water treatment method	Characteristics
Disinfection only	Distribute surface water and groundwater with only chlorine disinfection.
Slow sand filtration method	Filter raw water at a slow speed of several meters per day. Microorganisms grow on the surface of the filtration sand and remove organic substances through their action.
Rapid sand filtration method	After coagulation and sedimentation of impurities in the water with chemicals, filter water at a speed of 120-180 meters per day through filtration sand.
Advanced water treatment method	Ozonation and biological activated carbon adsorption treatment added to rapid sand filtration process.
Membrane filtration method	Pass the raw water through a membrane with ultra-fine pores and separate the impurities in the water.

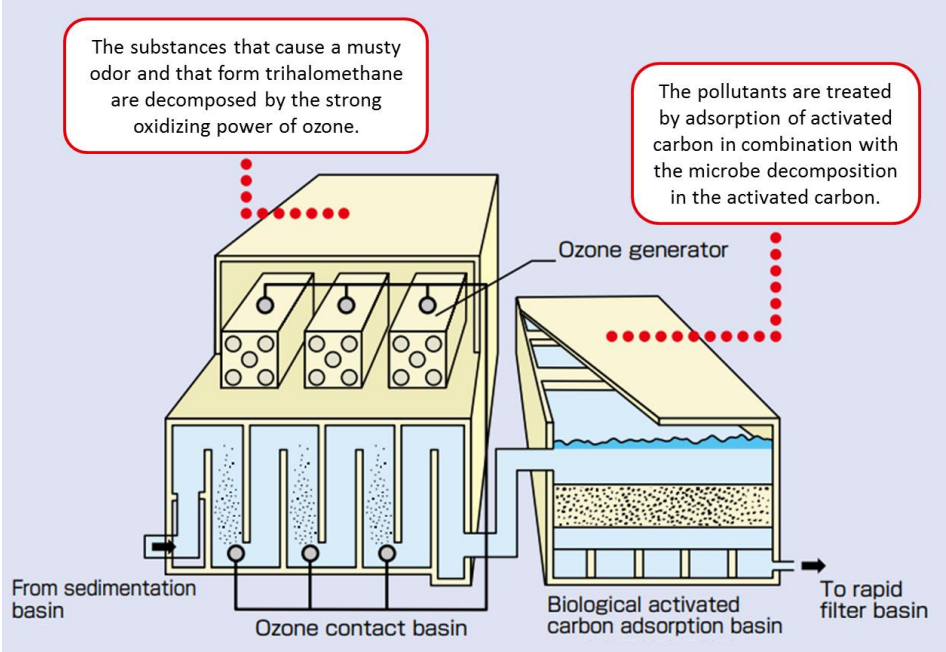
State-of-the-art Water Treatment Technologies

Advanced Water Treatment

In response to customer demand for safer and better-tasting water, we have introduced an advanced water purification process that incorporates ozonation and biological activated carbon adsorption treatment in a rapid sand filtration system. Since the first introduction of advanced water treatment at the Kanamachi Purification Plant in 1992, we steadily promoted its development at other plants located along the Tone River System. The installation at these plants was completed in 2014; currently all the water taken from the Tone River System is treated through the advanced water treatment system.



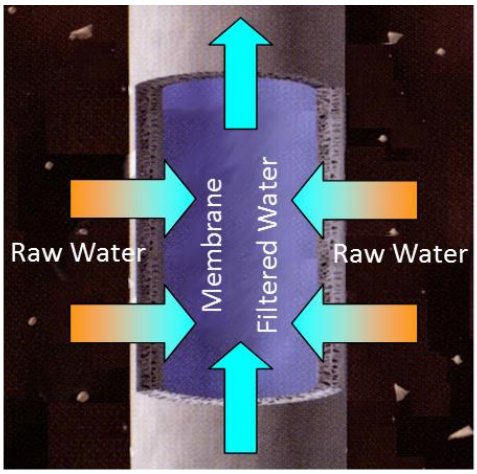
Ozone Contact Basin



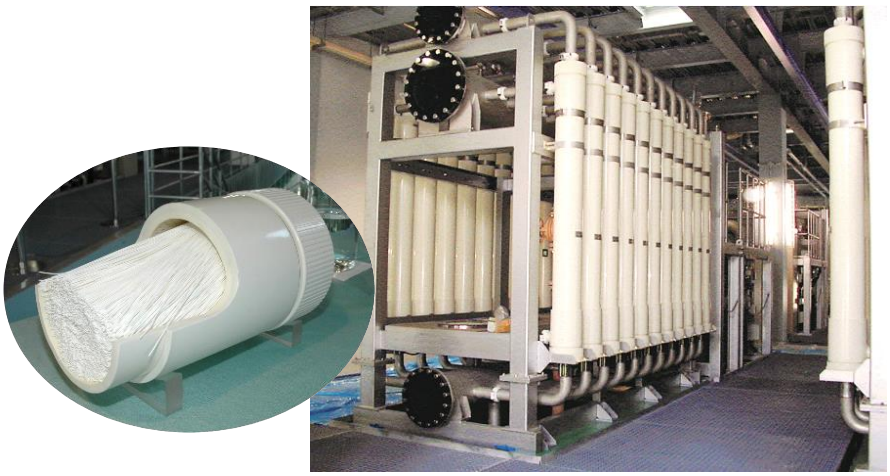
Advanced Water Treatment Facility

Membrane Filtration Treatment

When water passes through a membrane with ultra-fine pores, the suspended substances and microbes, such as cryptosporidium in the raw water, are removed. We installed one of the largest membrane filtration facilities at the time in Japan at the Kinuta purification plant and the Kinutashimo purification plant in FY2007, and are also operating membrane filtration facilities at 11 smaller water treatment plants in the Tama area.



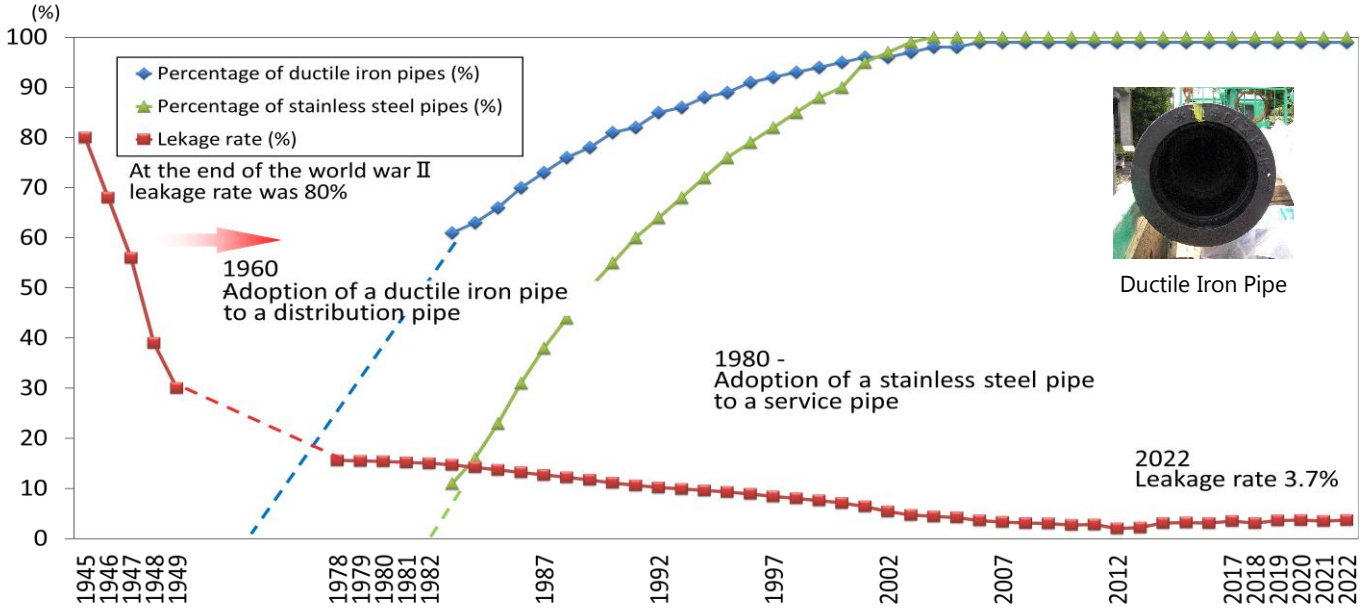
Mechanism of Membrane Filtration Treatment



Membrane Filtration Facilities

Leakage Prevention Measures

Tokyo's leakage rate was over 20% about 60 years ago, but by FY2022 it had improved to 3.7%. The total length of the distribution pipes in Tokyo is now 27,466 km, yet the leakage rate is one of the lowest rate in the world. The reduction in the leakage volume can also contribute to a reduction in environmental burden by reducing the volume of CO_2 emissions.



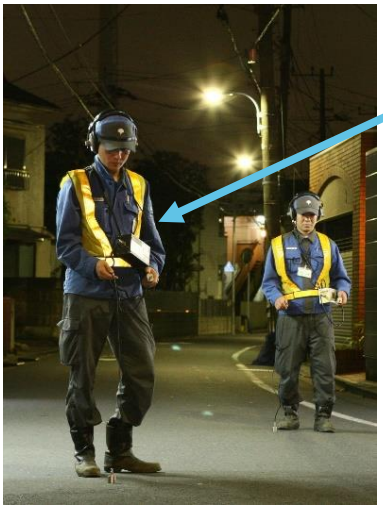
This reduction in leakage rate is the result of our proactive leakage prevention measures. In principle, we repair surface leaks right on the same day they are found. Also, we are systematically conducting leakage measurements and patrols for underground water leakages. As for the replacement of aged distribution pipes with ductile iron pipes as a preventive measure, we have completed 99.9% of the total replacements. Furthermore, we have replaced the lead service pipes with stainless steel pipes, and the percentage of stainless steel pipes has reached 100%. In addition to these successive activities over many years, we have improved the efficiency of our work through the development and improvement of leak detection related equipment, such as electronic leak detector, minimal flow measurement equipment, correlative leak detector and time integration leak detector.

Leakage Prevention Measures in Tokyo

- Planned replacement of water pipes and improvement of pipe materials
- Early leak detection and early repair
- Ensuring a high standard of leakage prevention technologies

Leak Detection Using a Leak Sound Detection Bar

Leak Sound Detection Bars



Leak Detection Work at Night

Electronic Leak Detectors

Measures Against Earthquake

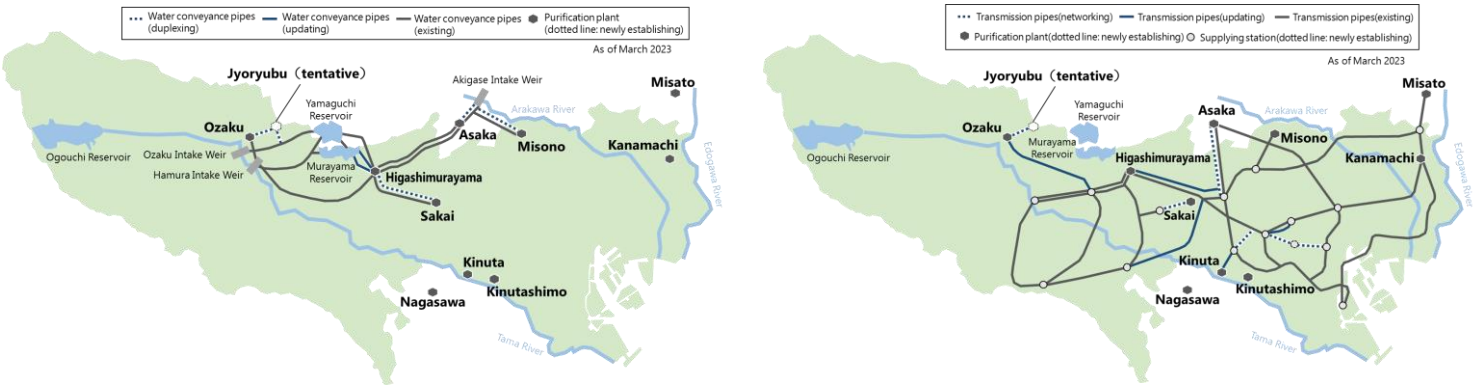
Reinforcing Resilience of Waterworks System

Japan is one of the earthquake-prone countries in the world. In March 2011, "the 2011 off the Pacific coast of Tohoku Earthquake" with a magnitude of 9.0 registered a maximum JMA (Japan Meteorological Agency) seismic intensity of "5 upper" in Tokyo, and other earthquakes that have caused extensive damage to water supply facilities have occurred throughout Japan. Furthermore, it is expected that an earthquake directly under the Tokyo metropolitan area is imminent. The Tokyo Disaster Management Council estimates that this earthquake could produce areas a maximum magnitude of 8.2, with a seismic intensity of 7, as well as a wide area a seismic intensity of 6 upper.

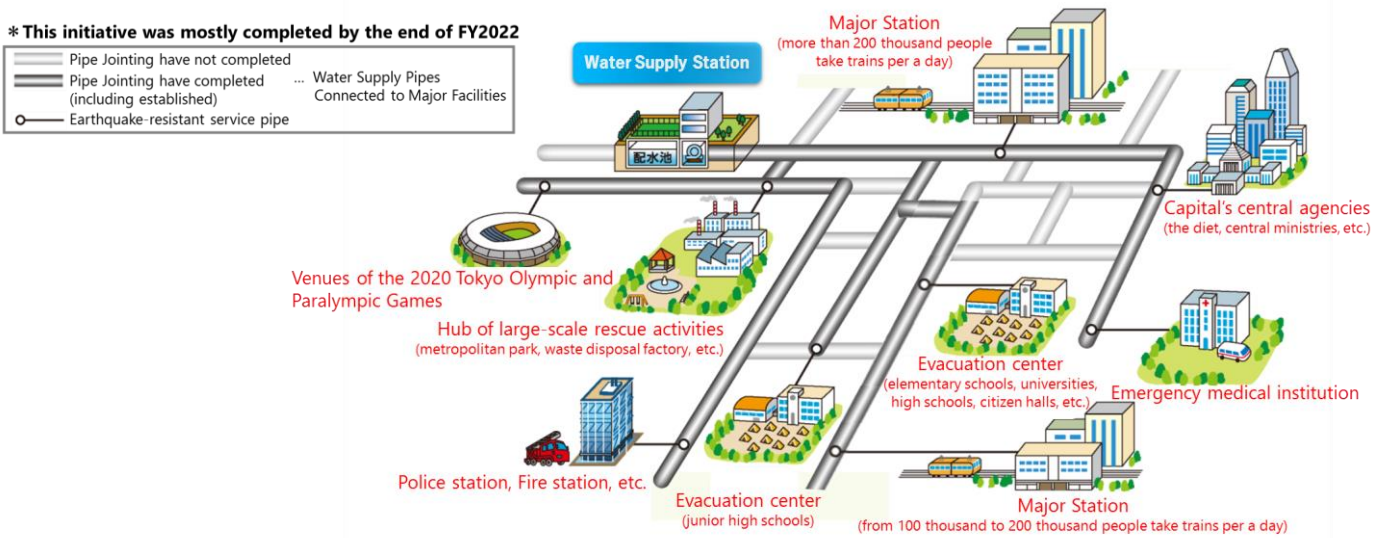
* JMA seismic intensity scale is an index used in Japan that indicates the strength of shaking and severity of damage caused by an earthquake. Please see the JMA website for the details : https://www.jma.go.jp/jma/en/Activities/inttable.html.

Since Tokyo Waterworks Bureau takes a role to support the lives of 14.04 million of Tokyo citizens, urban activities and central functions of the capital, it is crucially important for us to secure the water supply in case of occurrence of serious earthquakes. Taking these circumstances into consideration, we recognize the measures against earthquake to be one of the highest priority agendas, aiming to build an antiseismic water supply system suitable for the capital city, Tokyo. The main measures to achieve this goal are to promote the reinforcement of earthquake-resistance of water supply facilities such as reservoirs, intake and conveyance facilities, water purification facilities, distribution pipes, and water supply pipes. In addition, we will promote the strengthening of backup functions as follows.

- Duplexing and renewal of water conveyance facilities
- Networking and renewal of transmission pipes



Proposed Site for Installation of Water Conveyance Facilities/Transmission Pipes (Image)



Pipe Joining by Earthquake-Resistant Joints in Water Supply Pipes Connected to Major Facilities(mostly completed in FY2022)
(An Example of a Water Pipe Replaced by Earthquake-Resistant Joints) (Image)

Securement of Drinking Water

When water suspension or other accidents occur in an earthquake disaster, we set up "Emergency Water Supply Stations" at the following places in order to offer emergency water supply.

- Waterworks facilities and facilities for storing water underneath parks
- Evacuation cites, etc.

International Cooperation

Human Resources Development

Upon requests from overseas water utilities, we deliver and share our advanced technologies and know-how to contribute to the development of their human resources in cooperation with related institutions.

- Trainings in Japan

We conduct leakage prevention exercises, lectures on water quality management and customer service techniques, and site visits to our facilities including purification plants. We accepted approximately 731 trainees* between FY2017 and FY2022. *Including online training

- Sending our staff abroad

We dispatch our professional staff with necessary expertise and techniques for the challenges and needs of the developing countries through Japan International Cooperation Agency (JICA) and other international organizations.

Training for Water Leakage Prevention

Project Development

In response to requests from overseas water utilities, we utilize ODA and collaborate with other organizations such as private companies to improve the water situations in overseas cities with our technological capabilities.

- Technical cooperation projects

We are engaged in technical cooperation projects such as training of experts in water utilities in developing countries.

- Infrastructure development and operation projects

In cooperation with the private sector, we are working on overseas projects in fields such as non-revenue water countermeasures.

Information Dissemination

To enhance Tokyo's international presence, we broadly deliver and share information on our techniques, know-how, and advanced policies both domestically and internationally.

- International conferences

We actively participate in international conferences held in Japan and overseas, and broadly deliver and share information on our techniques and know-how to the world through paper presentations and exhibitions. In September 2018, the 11th IWA (International Water Association) World Water Congress & Exhibition (IWA WWCE) was held in Tokyo. This was the first IWA WWCE held in Japan where experts from around the world gathered to share their knowledge of water supply, sewage and the water environment field. A total of 9,815 people from 98 countries including Japan participated in the conference (of which 2,846 were congress registrants).

- Knowledge sharing

We have a website to introduce our activities to professionals in overseas water utilities.

For more details of the Bureau's efforts, updates and application for trainings related to international activities, please visit our website.
https://www.waterworks.metro.tokyo.lg.jp/eng/waterprofessionals/

Bureau of Waterworks
Tokyo Metropolitan Government

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