



 **International Cooperation of
Tokyo Waterworks**



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Located nearly the center of the Japanese archipelago, Tokyo is the capital of Japan where the population and economic bases of the country are concentrated.

The total area and population are approximately 2,190 km² (about 0.6 percent of the total area of Japan) and 13.95 million people (about 10 percent of the total population of Japan). (As of January, 1 2020)

The Bureau of Waterworks, Tokyo Metropolitan Government – the largest-scale waterworks utility in Japan – supplies water to almost all areas of Tokyo.

| | |
|-------------------------------------|--|
| Service Area | 1,239.27km ² |
| Population Served | 13,600,443people |
| Pervasion | 100.00% |
| Number of Service Connections | 7,767,460cases |
| Total Length of Distribution Pipes | 27,265km |
| Total Capacity of Facilities | 6,859,500 m ³ /day |
| Total Distribution Amount Per Year | 1,542,737×10 ³ m ³ |
| Maximum Distribution Amount Per Day | 4,500,500 m ³ /day |

▲ Major data (As of March 2020)

(note) Service area, population served, pervasion and number of service connections and numbers as of October 1, 2019.

Introduction

Tokyo Waterworks has supported civic life and urban activities in the capital of Japan, Tokyo for over 120 years since the establishment of modern waterworks. During such long-term service operations, we have overcome various problems including rapid water demand increase and raw water deterioration, thereby evolving into an utility with the world-class operational scale and technology.

Currently, in urban areas in developing countries, water shortage and pollution associated with rapid economic development and population increase have become obvious, most of which are what we have faced and resolved through our long history.

We have provided our accumulated technology and know-how through trainings in Japan and staff dispatch in response to requests mainly from Asian cities. In recent years, we have promoted technical cooperation and infrastructure development collaboration companies in order to improve circumstances surrounding water supply in overseas countries, utilizing the Official Development Assistance (ODA).

Also, we actively participate in international conferences held in Japan and abroad, and widely disseminate our technologies and know-how through paper presentations and exhibitions.

We will continue to contribute to the improvement of circumstances surrounding water supply in developing countries, taking advantage of practical technologies and service operating capabilities that have been accumulated in our experiences.

This brochure is a comprehensive and systematic summary of international cooperation promoted by Tokyo Waterworks. We would appreciate it if this brochure can be utilized by water utilities from all over the world.

**Bureau of Waterworks,
Tokyo Metropolitan Government**



Strengths of Tokyo Waterworks

■ Our history – overcoming various problems

We started water supply as a modern water supply utility in 1898. At the beginning, our facility capacity was 170,000 m³ per day, which is about one fortieth of the current capacity.

Facing various problems during our history over 120 years, we have grown along with Tokyo's development while overcoming them one by one. We have now become a waterworks utility with the world-class facilities and technologies.

● **Post-WWII period: Efforts for leakage prevention measures**

Our facilities were damaged due to the World War II. In particular, the domestic supply systems were devastated. In the immediate post-war years, the water leakage rate reached up to 80 percent. As a result of the emergency measures taken for leakage prevention, however, the rate dropped to just about 30 percent in 1948, just 3 years afterwards.

Thereafter, as a result of working on leakage prevention measures in an energetic and systematic manner, we have now achieved one of the world's lowest leakage rate of about 3 percent.

● **1950's-70's: Responses to rapid increase in water demand and period of financial difficulties**

The water demand rapidly increased due to population and industrial concentrations associated with high economic growth. Moreover, we had a large drought due to extremely low rainfall in 1964, the year the Tokyo Olympics were held.

Consequently, we have responded to the rapid increase in water demand by increasing the facility capacity by 3.8 million m³ in 14 years through the expansion works of the Tone river water system while securing water resources.

Furthermore, financial pressures significantly grew due to large-scale expansion works and rapid price increase associated with the high economic growth.

During the period, we have overcome financial difficulties by making various managerial efforts such as promoting operational efficiency, and revised water charges as required while gaining understanding of Tokyo citizens.

Currently, we have realized stable management by setting the direction of policies from a long-term perspective and formulating financial plans in every 3 to 5 years.

● **After 1990's: Responses to raw water quality deterioration**

In the process of urban development, we received many complaints about problems such as musty odor caused by deterioration of river water quality.

Thus, in order to constantly remove musty odor substances throughout the year, we introduced the advanced water treatment using the ozonation and the biological activated carbon adsorption treatment in order to supply pure and high quality water.

■ Working toward a better future

The population of Tokyo peaks in 2025 then begins to decline, and water rate income will also decrease along with it. We plan to upgrade facilities properly, including large water purification plants built during the period of high economic growth.

The Waterworks Act, which came into effect on October 1st, 2019, stipulates that infrastructure shall be strengthened through public-private partnerships and wide-area partnerships.

In addition, the environment of Tokyo's waterworks business is in a phase it has never experienced before, facing frequent occurrence of natural disasters due to climate change, and the promotion of the digital transformation.

Based on these situations, we formulated "Tokyo Waterworks Long Term Strategic Initiative 2020" in July 2020, which is our basic principle for business management from a long-term perspective for the following 20 years.

To achieve the future plans on this initiative, we formulated "Tokyo Waterworks Management Plan 2021", which is a mid-term management and financial plan for FY 2021 to FY 2025.

While operating our business on a long-term perspective, we will enhance effectiveness of our management plan, and thoroughly manage objectives for business management and facility development to ensure accountability for Tokyo citizens.

Also we will conduct verification on a regular basis, and brush-up initiatives to achieve our objectives. Finally, we will construct resilient Tokyo Waterworks, exerting our all efforts.

Pursuit of safety and security - Drinking water directly from tap

We have made it possible to ensure a stable supply of even safer, purer and higher quality water through precise water quality controls and advanced water purification.

We have given customers opportunities to try safe, pure and high quality water, by offering water tasting at events. Those who have tried Tokyo tap water have said “The quality of water has improved.” and “I drink tap water often.”

Precise water quality control

We conduct precise water quality control all the way from the water source to the faucet, in order to provide safe, pure and high quality water.

As for water resources such as rivers, we have made efforts to obtain the reality of actual conditions and early detect abnormalities in water through regular water quality monitoring and patrols.

Also at purification plants, we carry out constant monitoring and water examination using water quality meters, thereby working on appropriate water treatment.

Moreover we have carried out multiple checks of water safety by installing automatic water quality meters within the water supply area and conducting regular detailed inspection (e.g. constant monitoring of the color, turbidity, and residual effect of disinfectants).



▲ Automatic water quality meter

Advanced Water Treatment

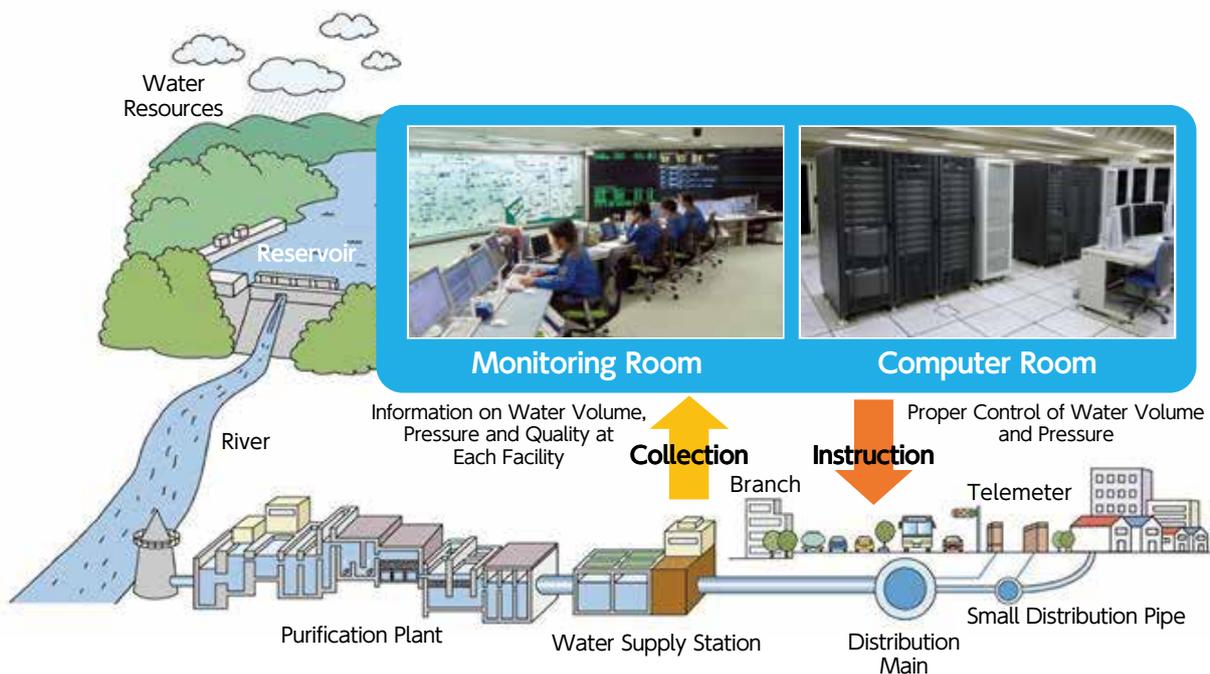
We have introduced the advanced water treatment as a countermeasure against musty odors that cannot be removed adequately by normal treatment.

The advanced water treatment is the one that combines rapid sand filtration with ozonation and biological activated carbon adsorption treatment, which produces effects on the treatment of organic substances such as musty odor substances.

Stable supply of water - 24 hours a day control system

In order to accurately track the operating conditions of Tokyo's massive and complex waterworks system, we use a water supply operation system composed of mainframe computers and communications devices. With this system, we can centrally gather all manner of information from water sources to water distribution pipes, and monitor the network 24 hours a day.

Utilizing the advanced functions of this water supply operation system and the knowhow of our highly experienced staff, we respond to daily fluctuations in demand and emergencies including accidents and disasters, properly controlling our massive waterworks system.

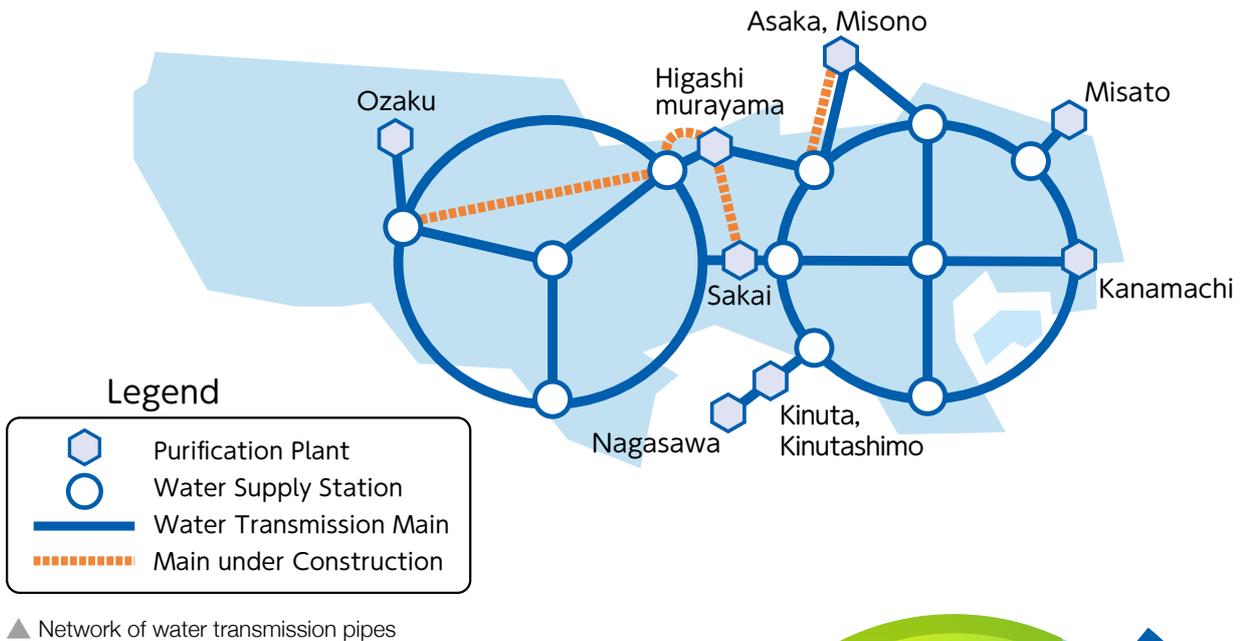


▲ Relationship diagram for water supply control management

■ Enhancement of backup functions – Delivering water even in times of disasters

In order to supply water even when an individual facility has shut down for upgrades or because of a disaster or accident, we are strengthening the backup functions of our overall waterworks facilities. This includes building substitute purification facilities, building new water supply stations, enhancing existing water supply stations, adding redundant pipelines, and pipe networking to ensure backup.

Furthermore, to minimize damage to waterworks facilities during disasters and ensure water supply as much as possible, we are implementing seismic retrofitting throughout the entire waterworks system, from water intake to water supply. This involves seismic retrofitting of facilities such as purification plants and water supply stations, as well as converting to water pipelines with earthquake resistant joints.



▲ Network of water transmission pipes

The total length of water distribution pipes amounts to approximately 27,000km, which is equivalent to about two thirds of the way around the globe.



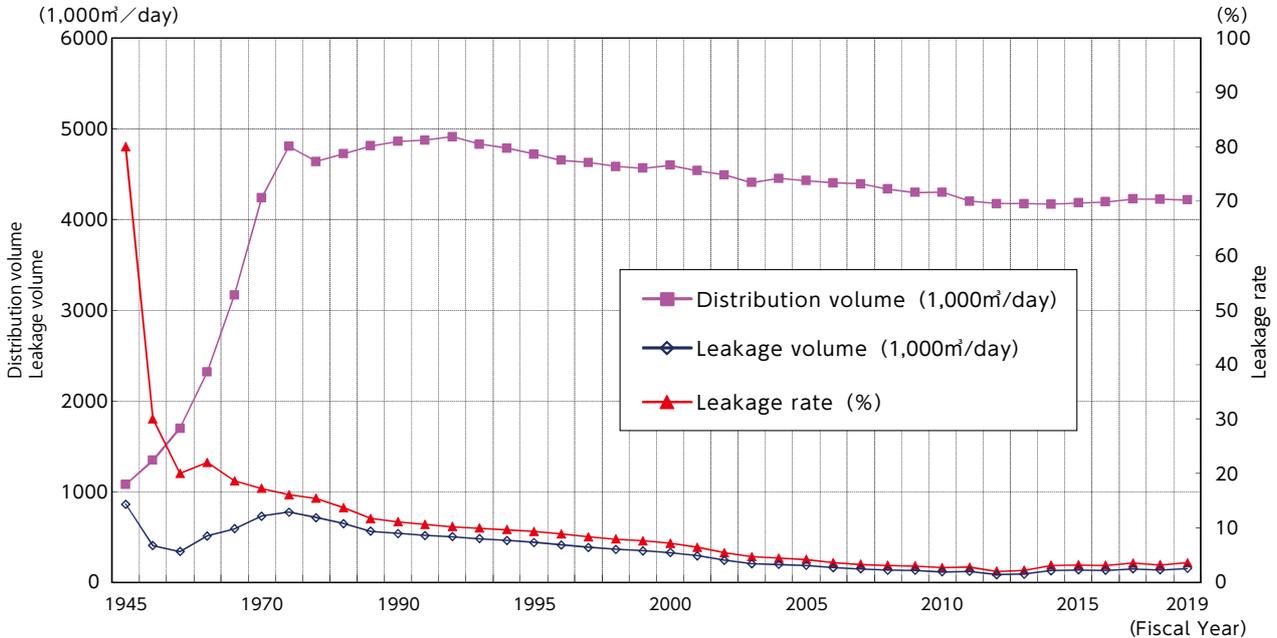
In order to secure supply routes to central government institutions during disasters, and respond swiftly to sudden accidents, we have established the Specialized Unit of Crisis Management, which operates actively 24 hours a day, 365 days a year.

Also, to offer mutual assistance including rapid restoration of facilities when a disaster does occur, we have established cooperative relationships with other waterworks utilities by signing memorandums of understanding.

World's lowest leakage rate – High technologies based on experiences

As a result of planned replacement of distribution pipes, early detection and repair of leakage, and securing of staff's advanced high technologies, we have now realized the world's lowest leakage rate of about 3 percent.

The leakage prevention measures have contributed to not only efficient use of our limited water resources but also the prevention of secondary disasters (e.g. poor water flow, sagging road, and inundation) and energy-saving in the process of water purification, transmission and distribution.



▲ Trend in water distribution amount, water leakage and leakage rate

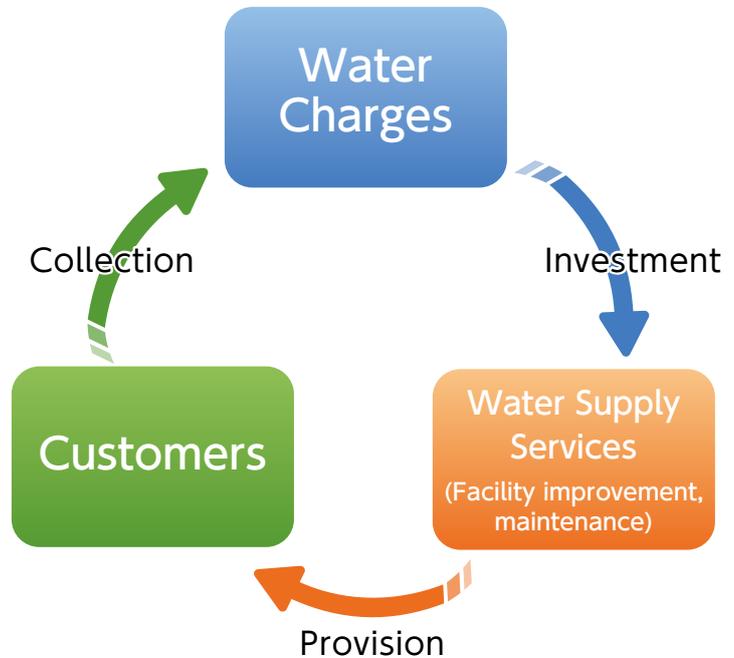
Long-term perspective management – Financial basis for stable management

A strong financial basis is essential in order to realize sustainable management. This basis is made possible by realizing a management cycle in which we provide a water supply service through appropriate investment, collect payment for this service from customers in the form of water rates, and reinvest collected payments back into our services.

We must also formulate management plans and facility construction plans based on a long-term initiative with a view to the future, and operate our business based on a long-term perspective, by giving concrete shape to our future direction.

We publish these plans on our website, and explain them to customers in an easily understood format.

Furthermore, by establishing diverse methods of payment and an appropriate rate collection system, we have realized a final collection rate* of 99.9%, which supports this sustainable management system.



▲ Sustainable management cycle of water services

*Final collection rate is calculated by subtracting the deficit rate from 100 percent.

Structure of International Cooperation

As part of Tokyo Metropolitan Government's city diplomacy, we have promoted international cooperation by utilizing our technologies.

International Cooperation of Tokyo Waterworks

Human Resources Development

Contribution to HRD of overseas entities by introducing our excellent techniques and know-hows to them

p.9 - p.11

Main details

- ◆ **Trainings in Japan**
- ◆ **Staff dispatch**

Achievements

Acceptance of trainees

- FY2017 43 countries, 347 trainees
- FY2018 52 countries, 292 trainees
- FY2019 51 countries, 214 trainees

Project Development

Improvement of water situations in overseas cities by using our technologies

p.12 - p.15

Main details

- ◆ **Technical Cooperation Projects**
 - Technical Cooperation Projects
 - JICA Partnership Program
- ◆ **Infrastructure development and operations projects**
 - Non-revenue water prevention projects
 - Facility development and operations projects

Achievements

- Vietnam(Hanoi), Malaysia
JICA Partnership Program
- India(Delhi)
Technical Cooperation Project
- Thailand(Bangkok), Myanmar(Yangon)
Non-revenue water prevention projects
- Myanmar(Yangon)
Technical Cooperation Project

Information Dissemination

Wide dissemination of our innovative efforts to Japan and abroad for improving the presence of Tokyo

p.16 - p.21

Main details

- ◆ **International Conferences**
 - Hosting of International Conferences
 - Presentation at International Conferences
- ◆ **Knowledge Sharing**
 - Accumulation of innovative cases
 - Cooperation with leading cities

Achievements

- Hosting the 11th IWA World Water Congress & Exhibition 2018 in Tokyo
- Information Dissemination and knowledge sharing at International Conferences
- Operating the website for water professionals

Scheme of International Cooperation

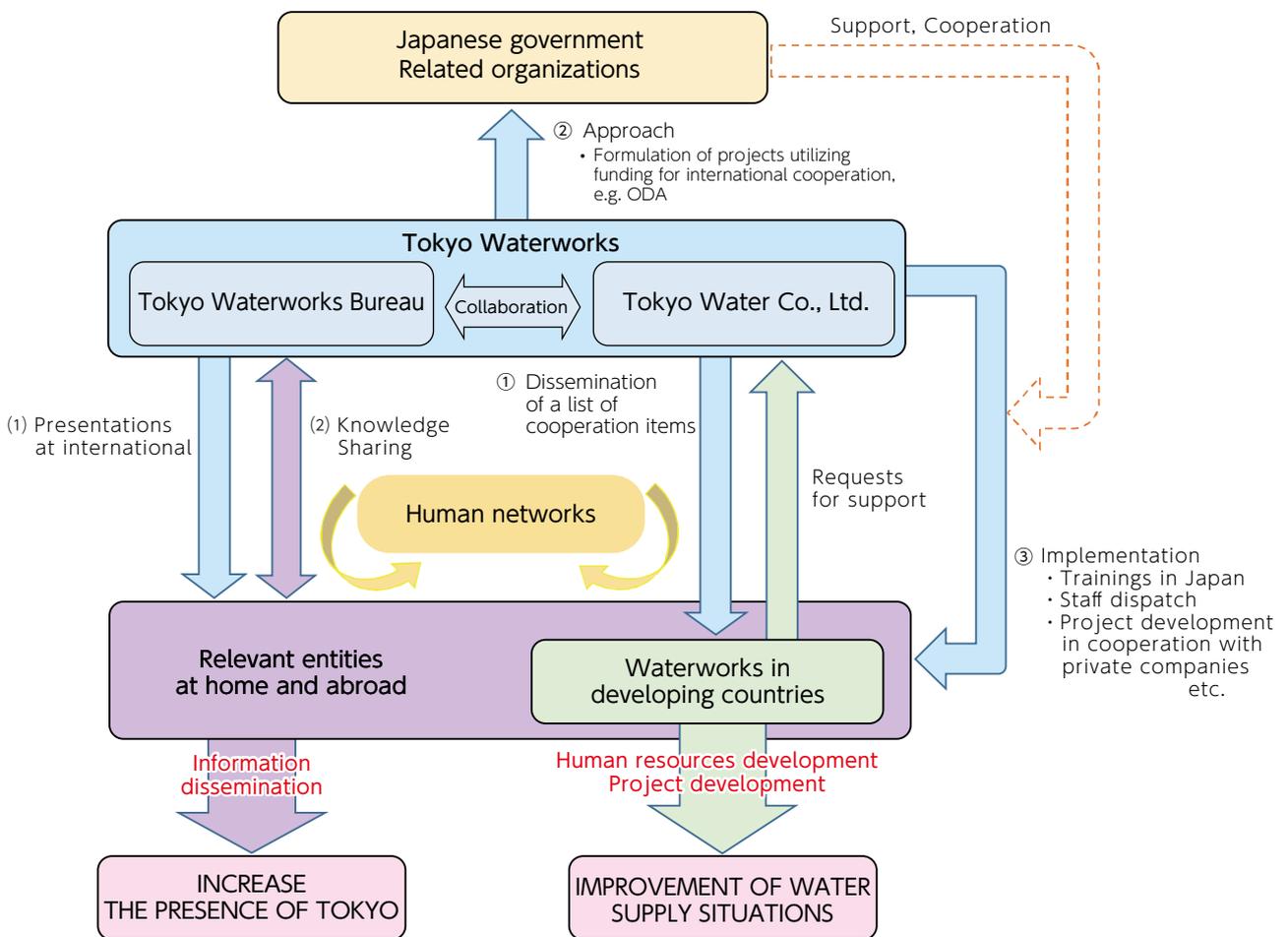
● Human resources development / Project development

1. Disseminating the list of our cooperation items to the world, mainly to developing countries.
2. Working on formulation of projects utilizing funding for international cooperation (e.g. the Official Development Assistance: ODA) in cooperation with the Japanese government and related organizations that promote international cooperation, based on support requests from developing country waterworks.
3. Implementing efforts that correspond to the needs of overseas waterworks: training in Japan, staff dispatch as instructors, and project development in cooperation with private companies.

● Information dissemination

1. Widely disseminating information on our technologies and know-how to relevant entities at home and abroad through presentations at international conferences.
2. Sharing latest knowledge with leading cities while improving the presence of Tokyo.

< Scheme of international cooperation (image) >



For more information from Tokyo Waterworks, please contact the following e-mail address.
Please note that we will make no payment for travel expenses, living expenses, etc.

[Contact] international_affairs@waterworks.metro.tokyo.jp

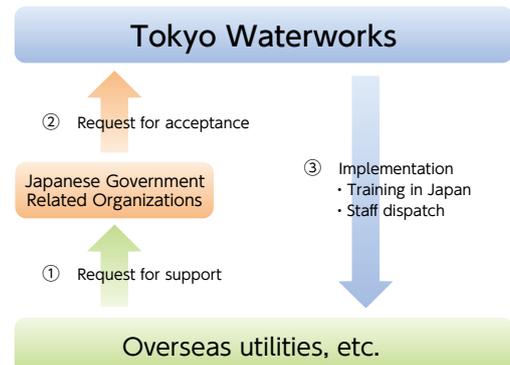
3-1 Human Resources Development – Trainings in Japan –

We provide trainings for overseas waterworks operators on overall water services from water resources to taps, e.g. functions of water storage facilities, measures for leakage prevention and management of water supply equipment.

We provide lectures on each field, tours at purification plants, and field practical trainings at the Training and Technical Development Center. Lecturers are our experienced staff.

● Schemes for human resources development

Based on requests from waterworks utilities in developing countries, we provide training in Japan for their staff and dispatch instructors abroad.



● Training Menu

| Field | Training Subject | Details | |
|-----------------------------------|--|---|--|
| Water Resources | Functions of water storage facilities | Lecture | Roles and histories of dams and reservoirs |
| | | Tour | Surrounding facilities of the dam |
| | Functions of water conservation forest | Lecture | Roles and management practice of water conservation forest |
| | | Tour | Water conservation forest owned by us |
| Water Purification | Water treatment | Lecture | Outline of our purification plants Water treatment methods (advanced water treatment, etc.) |
| | | Experiment | Coagulation-sedimentation and ozonation |
| | | Tour | Water Purification Plant |
| | Water quality management | Lecture | Comprehensive water quality management |
| | | | Water examinations of water resources, plants and hydrants |
| | | | Responses to water quality accidents |
| Water Distribution | Water supply control management | Lecture | Comprehensive water supply control |
| | | | Method of formulating operational plans |
| | | | Monitoring of water supply operations status, practice of operations instruction |
| | Distribution pipe replacement | Lecture | Distribution pipe replacement plans based on priority |
| | Maintenance of Distribution pipe | Lecture | Development status and maintenance method |
| | | | Construction management, quality and safety control |
| | Works for distribution pipe replacement | Tour | Worksites for distribution pipe replacement Sites of installed bridge-attached pipes |
| Practice | | Pipe connection | |
| Mapping system for water services | Lecture | Efficient management of data on water pipe routes | |
| Leakage Prevention | Leakage prevention measures | Lecture | Leakage prevention work Method of formulating plans for leakage prevention |
| | | Practice | Leakage detection using leak sound bar and electric leakage detectors, Leakage repair |
| Water Supply Equipment | Management of water supply equipment | Lecture | Basic knowledge, verification system and practice |
| | | Practice | Diverging / plumbing water supply equipment |
| | Water meter management | Lecture | Management method of water meters |
| | | Tour | Water meter testing facilities |
| Customer Service | Customer Service | Lecture | Collection of water charges, Meter reading |
| Others | Emergency water supply tanks for disaster measures | Lecture | Structure and management of emergency water supply tanks for disaster measures |
| | | Tour | Emergency water supply tanks installed at parks for disaster measures |

* If you wish to know the information about our training courses, please contact the following e-mail address.

[Contact] international_affairs@waterworks.metro.tokyo.jp

● Lectures and facility introductions done by experienced staff

Experienced staff who work in Tokyo waterworks serve as instructors, conducting lectures and introducing facilities based on requests from trainees.

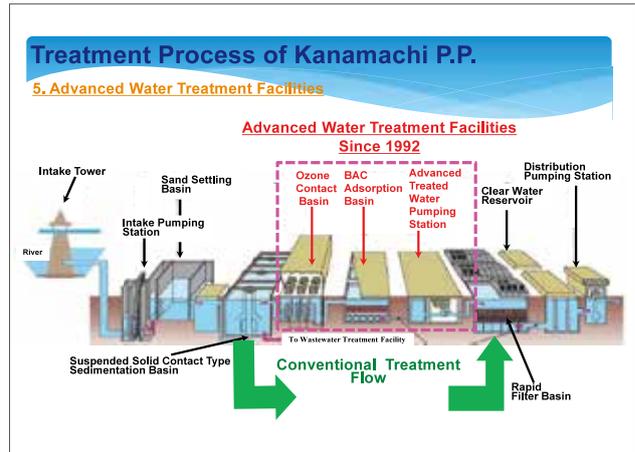
Lectures and tours of purification plants

- Instructors explain the mechanisms of purification at each purification plant, from water intake to water supply, as well as the flow of water from water sources to purification plants.
- After lectures, trainees can tour advanced purification facilities such as ozone treatment and biological activated carbon adsorption treatment, as well as standard purification facilities such as membrane filtration facilities that remove impurities from water using filtration membranes*.

* Facilities available for tours vary at each water purification plant.



▲ Lecture on the outline of the purification plant



▲ Sample of our lecture material



▲ Tour of our purification plant



▲ Tour of our purification plant

Lectures on our waterworks mapping system

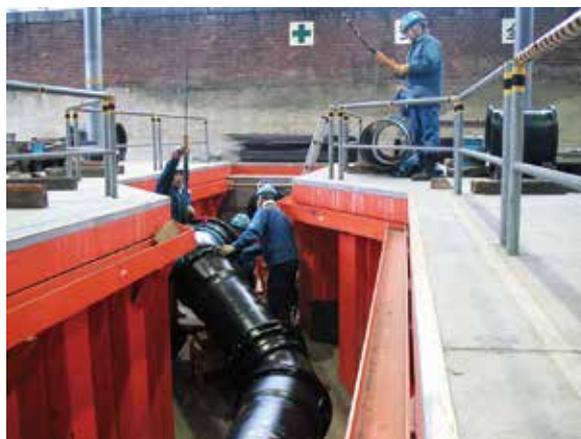
- We will give a lecture on our water supply mapping system, a water pipe data management system in Tokyo.
- We will give an overview of the water supply mapping system, which enables efficient maintenance of pipelines, as well as various functions used in actual business, such as simulation of the turbid water range.

● Practical training in training fields

We provide practical training menu so that overseas trainees can acquire waterworks techniques at the training field of the Training and Technical Development Center, in addition to facility tours such as at purification plants.

Training on connecting/branching distribution pipes

- We connect large-diameter ($\phi 500$) water pipes in a pit with curves and steps modeled after actual work sites.
- Trainees use small diameter distribution pipes ($\phi 100$ to $\phi 150$) to do pipe installation and branching, connections from above ground into the pit, pipe relocation, and water flow tests after pipelines are completed.
- Using exposed water pipes ($\phi 100$), we conduct practical training such as pipe installation from snap taps with saddles to faucets, and water pressure tests with manual test pumps.



▲ Pipe connection work

Leakage detection/repair

- Experience of hearing the sounds of leakage with different pipe materials and leakage points, using leak sound detection bar.
- Hearing of the sound of leakage and detection of leakage points with different pipe materials, using electronic leakage detectors.
- Providing practical and realistic trainings including those on emergency repair of leaking pipes, using exposed distribution pipes ($\phi 100$).



▲▼ Leakage detection/repair



■ Understanding and utilizing overseas water supply conditions through training

We conduct interviews of foreign trainees who have come to Japan, and get opinions on training content in order to understand the challenges and needs of foreign waterworks companies. We use the results of these interviews to support overseas expansion of Japanese companies and to brush up future training of Tokyo Waterworks conducted in Japan.

Utilizing our human network cultivated through these initiatives, we are disseminating our advanced initiatives far and wide.

3-2 Project Development

● Schemes for Project Development

Based on support requests from waterworks utilities in developing countries, we cooperate with private companies to implement projects utilizing funds related to international cooperation, including Official Development Assistance (ODA).

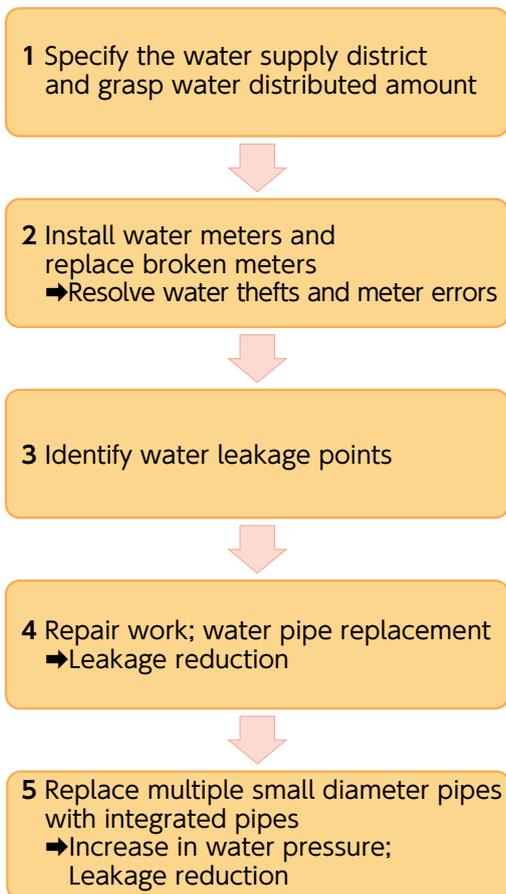


■ Support in various fields

Using our knowhow of policy cooperation organizations, we provide support in a variety of fields, including non-revenue water reduction projects and customer service support.

● Non-revenue water reduction projects

Tokyo Water Co., Ltd. collaborates with private sector companies to develop cooperative relationships built through human resource development and technical cooperation, and implement non-revenue water reduction projects to improve the water situation in a recipient country.



▲ Process of a non-revenue water reduction project (example)



▲ Implementation process 1-5



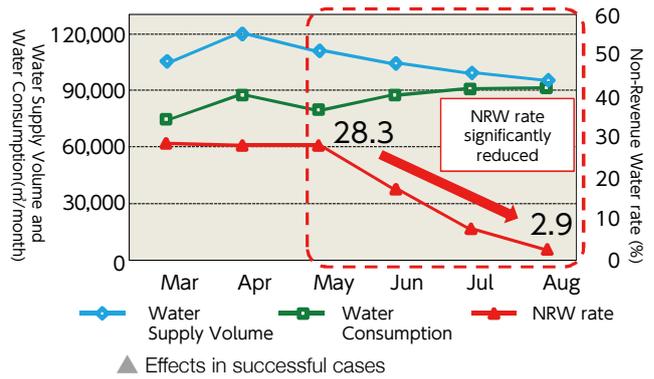
▲ Replacement of water pipes



▲ Electronic leakage detector made in Japan

Successful case

There is a case where a joint company established by Tokyo Water Co., LTD. and a private company significantly reduced the rate of non-revenue water in a short period of time through a project implemented in the target area.

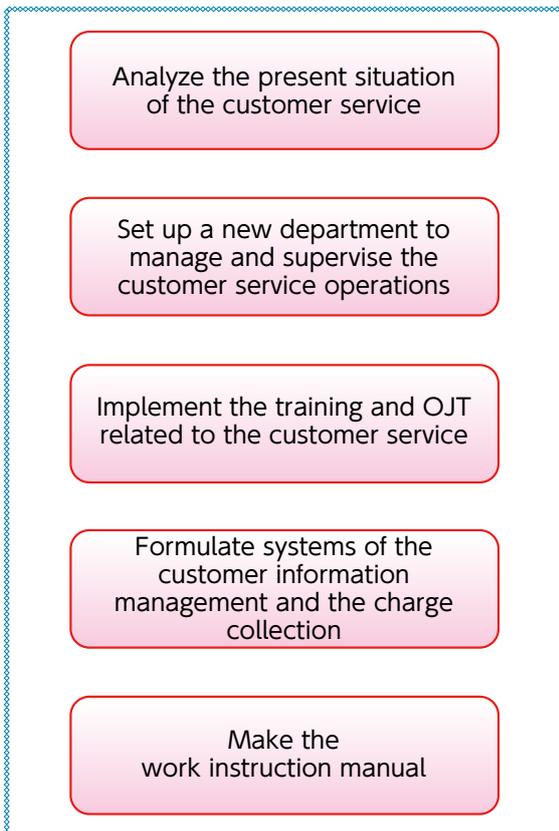


● Customer service support

Reliable rate collection is necessary in order to ensure stable operation of the waterworks business. In developing countries, there are some areas where knowhow of efficient rate collection has not been properly established.

For this reason, we provide guidance on site for how to manage customer data, collect rates, and produce manuals, and offers support to improve the capabilities of overseas waterworks utilities.

Process of the training related to customer services (example)



▲ Customer service supports

Specific details of initiatives

● *Developing staff of overseas water utilities*

We dispatch experts with specialized knowledge and skills related to the waterworks business, who develop staff of overseas water utilities.

Dispatched experts support capacity building of overseas waterworks utilities, such as by identifying local challenges, proposing improvements that utilize our experience and knowledge, holding field seminars, and offering guidance and advice through OJT.

We also dispatch experts to conduct preparatory surveys for ODA projects and make master plans.



▲ Presentation at a seminar



▲ Discussion

As part of the project development, we also conduct training in Japan for water utility staff from abroad.

Through the training in Japan, we provide opportunities to study advanced waterworks technology. This includes tours of various waterworks facilities such as dams and purification plants that support stable water supply to Tokyo, as well as practical training on water leakage prevention technology in the training field of our Training and Technical Development Center.

● *Developing a training field*

We develop a training field in the recipient country, which serves a base to continuously carry out human resources development.

Also, by utilizing the developed training field, we support training for trainers who train waterworks experts, which allows continuous human resource development within the recipient country after the completion of our training.

There was a case where we develop a practical training field for water leakage prevention modelled after our Training and Technical Development Center.



▲ Demonstration of an electronic leakage detector by alumni trainees



▲ Tour of a purification plant



▲ Practical training field for leakage prevention

● **Conclusion of Memorandum of Understanding (MOUs)**

As a result of developing long-term cooperative relationships through trainings in Japan and expert dispatches, there were some cases where we signed MOUs on human resources development and technical cooperation with overseas waterworks utilities.

The following is an example of MOU details.

- Improving techniques, experience and knowledge by mutual exchanges.
- Cooperation for the improvement of waterworks technologies (e.g. non-revenue water measures, antiearthquake measures and water treatment).
- Cooperation for the improvement of customer services (e.g. activities for awareness-raising, education and culture).



▲ MOU signing ceremony

● **Strengthening relationships with overseas waterworks utilities**

By dispatching staff for technical cooperation projects related to Tokyo Waterworks and disseminating information through our human network, we aim to build trust relationships between Tokyo Waterworks and overseas waterworks utilities.

We will also strengthen relationships by establishing a deeper understanding of our excellent technologies and initiatives.

● **Strengthen cooperation with the Japanese government and government agencies such as JICA**

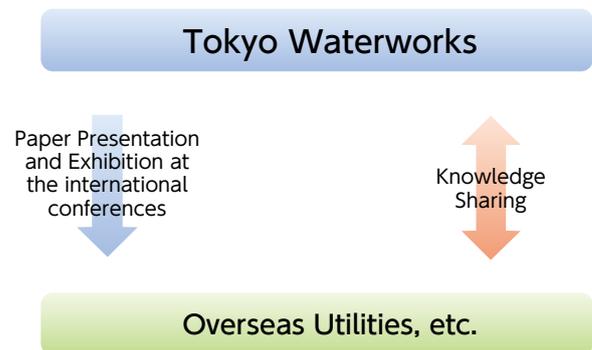
By attending conferences and local seminars hosted by the Japanese government and government agencies such as JICA, we will share information and exchange opinions on international cooperation efforts.

We will also strengthen cooperation with government agencies by participating in preparatory surveys for ODA projects and getting involved in planning the details of support.

3-3 Information Dissemination

● Schemes for information dissemination

- (1) By presenting papers and exhibition at international conferences, we spread information including the technology and knowhow of Tokyo Waterworks broadly to people involved in waterworks both in Japan and abroad.
- (2) Share the latest knowledge with other cities and improve the prominence of Tokyo.



■ Information Dissemination and Knowledge Sharing at International Conferences

We have actively participated in international conferences held both in Japan and abroad, and widely disseminated our technologies and know-how through paper presentations and exhibitions.

The presented papers cover a wide range of topics including water supply technologies (e.g. water purification, water quality), financial affairs, environmental measures, and human resources development. We have contributed to the solution of problems that are common to every country.

Also, through disseminating and sharing knowledge in international conferences, we learn latest and excellent cases of other cities or countries.

● Presentation at international conferences

| Field | Title of Presentation | Year |
|--|--|------|
| Facility Planning | Challenge for Reinforcement of Earthquake Resistance at Earth-fill Dam with Urbanization to Vicinity of Reservoir | 2018 |
| Water Resource | Management of Water Conservation Forests for Over 100 Years | 2017 |
| Water Quality, Purification | Production of a Serious Musty Odor in the Clean Upper Reaches | 2019 |
| | Construction of an Effective and Efficient Pesticide Examination System | 2018 |
| Water Distribution, Water Supply Operation | Ensuring Stable Water Supply by Centralized Administrative Control over a Large-Scale Water Supply Network | 2018 |
| Electric Machine | The Effect of Steel Segment's shielding against Stray Current from DC Railway Systems | 2018 |
| Environment | Application of Water Supply Operation System to Improve Efficiency of Hydraulic Power Generation | 2018 |
| | Effective Utilization of Unused and Renewable Energy for Greenhouse Gas Emissions Reduction | 2018 |
| Risk Management, Anti-earthquake Measures | On the use of steel pipe for crossing fault of flexure type in the Tama South-North line (tentative) development project | 2019 |
| | Rapid Emergency Repairs of Water Pipes through the Construction of a Leakage Information Collection System | 2019 |
| Management, Finance | Factor Analysis of Water Rate Revisions (External Factors and Internal Factors) | 2018 |

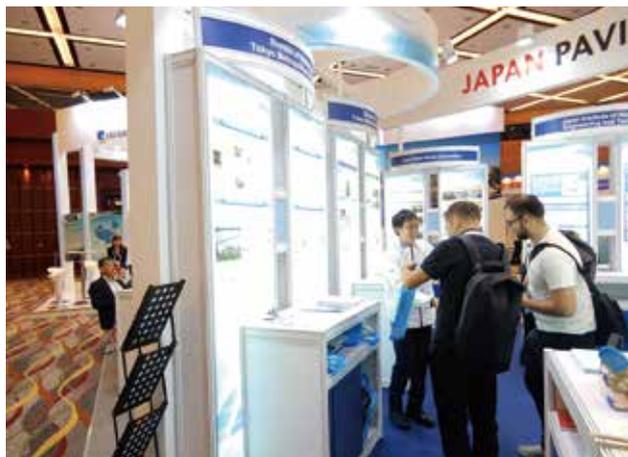


▲ Presentation at IWA-ASPIRE2019

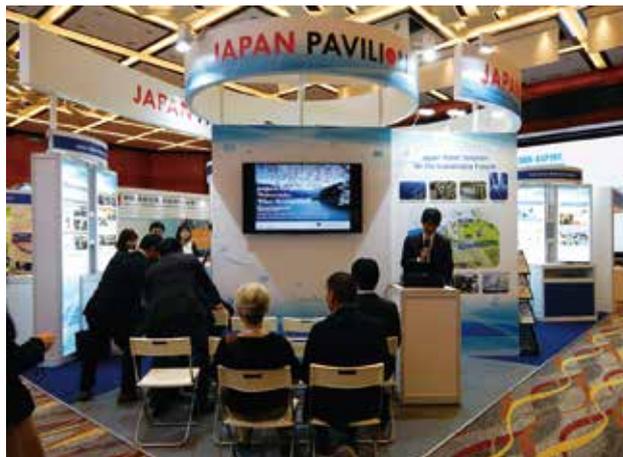


▲ Presentation at the 11th Water System Seismic Conference

● PR at exhibition booth



▲ Our exhibition booth at IWA-ASPIRE2019



▲ Presentation at IWA-ASPIRE2019 exhibition booth

▼ Major conferences participated

| Year | Conference Participated | Venue |
|------|---|------------------------|
| 2017 | IWA-LESAM 2017 (LESAM: Leading-Edge Conference on Strategic Asset Management) | Trondheim, Norway |
| | Singapore International Water Week Spotlight | Singapore |
| | The 7th IWA-ASPIRE Conference & Exhibition *1 | Kuala Lumpur, Malaysia |
| | The 10th Japan-America-Taiwan Waterworks Earthquake Countermeasures Workshop | Taiwan |
| 2018 | IWA-LET 2018 (LET: Leading-Edge Conference on Water and Wastewater Technologies) | Nanjing, China |
| | Singapore International Water Week | Singapore |
| | The 11th IWA World Water Congress & Exhibition *2 | Tokyo, Japan |
| 2019 | The 11th International Symposium on Water Supply Technology | Yokohama, Japan |
| | The 11th JWWA / WRF / CTWWA Water System Seismic Conference (Japan-America-Taiwan Waterworks Earthquake Countermeasures Workshop) | Los Angeles, USA |
| | IWA Specialist Conference on Natural Organic Matter in Water | Tokyo, Japan |
| | The 8th IWA-ASPIRE Conference & Exhibition *1 | Hong Kong |

*1 The IWA Asia Pacific Regional Group (IWA-ASPIRE) Conference & Exhibition is the IWA's conferences in the Asia Pacific Region, which is held biannually with an aim to solve water problems in the world and the Asia Pacific Region.

*2 IWA World Water Congress & Exhibition (IWA-WWCE) is the world's largest congress in the fields of water and sewage, in which stakeholders in the water field meet every two years.

■ Holding the 11th IWA World Water Congress and Exhibition

From September 16th to 21st, 2018, the 11th IWA World Water Congress and Exhibition was held by the IWA at Tokyo Big Sight (Tokyo International Exhibition Center).

Their Imperial Highnesses Crown Prince Naruhito and Crown Princess Masako (at the time) and minister-level officials from relevant ministries and agencies attended the event, and it attracted attention both in Japan and abroad. A total of 9,815 people from 98 countries participated in the 11th IWA World Water Congress, setting a new record for most participants.

Advanced initiatives and technologies relating to waterworks and sewerage were shared at the Congress, with the Governor of Tokyo and various water experts delivering keynote speeches. These were complemented by 985 paper presentations, as well as the Exhibition with exhibits by 252 organizations from 32 countries.

As a member of the host country committee composed of organizations from industry, academia, and government, We were involved in preparation and operation of the events. We also spread its advanced technology and knowhow to the world by presenting 69 papers written by its staff.



▲ Tokyo governor's greeting at the opening ceremony



▲ Oral presentation



▲ Awarding ceremony of Project Innovation Awards



▲ Tokyo Water Drinking Station



▲ Exhibition booths

Holding of the 4th IWA-ASPIRE Conference & Exhibition

Under the theme of “Towards Sustainable Water Supply and Recycling Systems”, we held the 4th IWA Asia Pacific Regional Group (IWA-ASPIRE) Conference & Exhibition in Tokyo in October 2011.

With more than 1,400 participants from 36 countries and areas and 819 paper presentations, this was a successful conference in which participants exchanged knowledge of each country through lively discussions.



▲ Ceremony at IWA-ASPIRE 2011



▲ Presentation at IWA-ASPIRE2011

Asian Waterworks Utilities Network of Human Resources Development (A1-HRD)

This network has carried out its activities since FY2008, aiming at the goal of improving water services throughout Asia by allowing the exchange of information about knowledge and know-how relating to human resource development and training methods between waterworks operators in the member countries.

The Network is currently composed of seven waterworks operators from five countries, which exchanges information through its website operations and newsletter publication, and holds annual meetings to introduce each operator's efforts and exchange opinions between them.

▼ Members of A1-HRD

| | |
|--------------------------------|---|
| Republic of Korea | Office of Waterworks, Seoul Metropolitan Government |
| | K-water |
| Taiwan | Taipei Water Department |
| | Taiwan Water Corporation |
| Kingdom of Thailand | Metropolitan Waterworks Authority |
| Socialist Republic of Viet Nam | Viet Nam Ministry of Construction, College of Construction No.2 |
| Japan | Bureau of Waterworks, Tokyo Metropolitan Government |



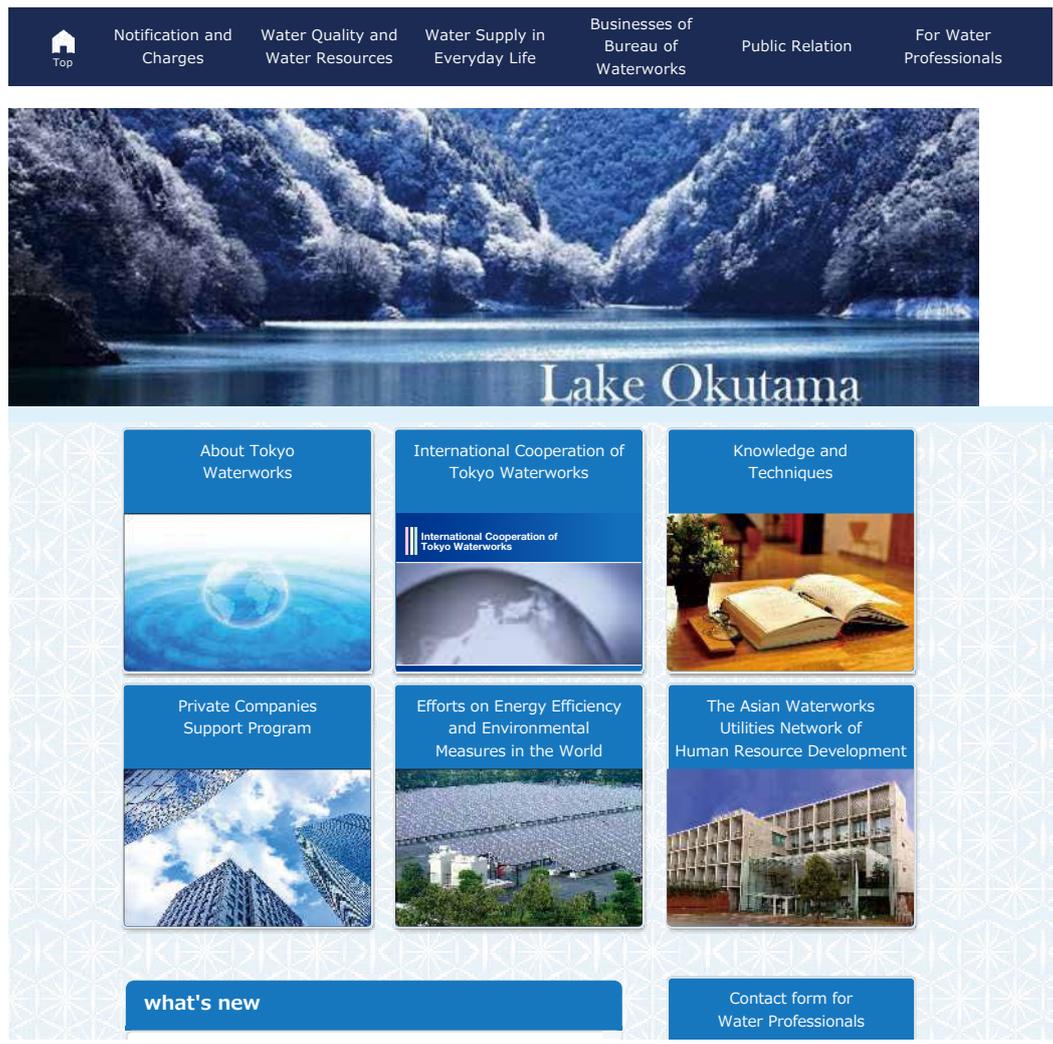
▲ A1-HRD meeting in 2019

International dissemination and sharing our techniques, know-how and knowledge

We operate a website to introduce our efforts to overseas waterworks experts.

Through the website, we disseminate information on our outline, techniques and know-how, and efforts relating to measures for international cooperation, and accept questions from overseas waterworks experts and researchers.

Aiming at knowledge sharing, we have set up a board to exchange information on each country's plans and cases related to energy and environmental measures.



We look forward to your visit to our website.

<https://www.waterworks.metro.tokyo.lg.jp/eng/waterprofessionals.html>

■ Human networks

After holding used the 11th IWA World Water Congress & Exhibition, Tokyo Waterworks promotes its “human network” initiatives to form new personal connections and continuously strengthen relationships with the staff of overseas water utilities. By accepting foreign trainees in Japan, promoting business in developing countries, and presenting papers at international conferences, our staff are building a new human network through exchanges with overseas waterworks utilities staff.

Also, in order to continuously strengthen relationships with our partners, we regularly spread information about our initiatives, including international cooperation, and collect case studied from overseas utilities.

● *Spreading information about initiatives*

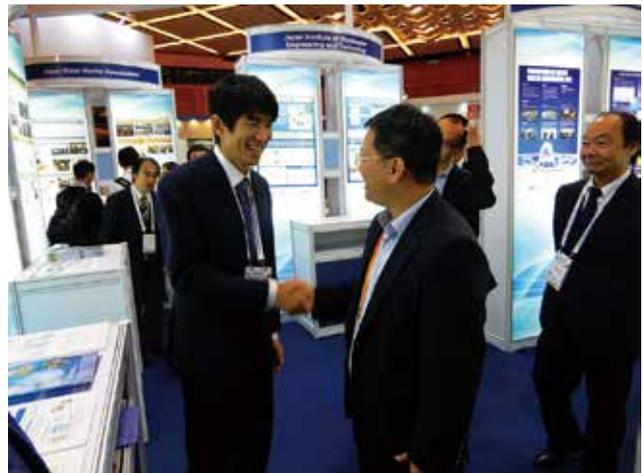
We spread information about the international cooperation initiatives of Tokyo Waterworks (acceptance of trainees, outlines of implemented projects, reports on participation in international conferences, etc.), our project outlines, and press content about international cooperation.

● *Case study collection*

In order to find reference materials for the initiatives of the Tokyo Waterworks, we collect examples of advanced overseas initiatives utilizing human networks.



Networking in the international event ▲▶



If you are interested in human network, contact us at the email address below.

[Contact Information] international_affairs@waterworks.metro.tokyo.jp



東京水道株式会社

Tokyo Water Co., Ltd. was established in April 2020, through the integration of TSS Tokyo Water Co., Ltd. (TSS), which handles technical operations, and Public Utility Services Center Co., Ltd. (PUC), which handles sales operations for Tokyo Waterworks.

We engage in overseas projects that meet the expectations of various countries by fully utilizing our strong sense of civic duty as a government policy collaborative organization and our business development capacity characteristic of private sector companies.

In cooperation with the Tokyo Metropolitan Government Bureau of Waterworks, and in collaboration with national government affiliated institutions that are promoting international cooperation, we actively provide technical guidance to local waterworks utilities staff using official development assistance (ODA), conduct training for foreign trainees both locally and in Japan, participate in international conferences and exhibitions, and conduct field surveys.

Through these activities, we engage in dialogue with waterworks utilities in foreign countries, and understand the challenges and needs of partner countries, so that we can build trust relationships and improve their understanding of our technology.

As a result of this, we have develop businesses that utilize technology for reducing non-revenue water in countries all around the world, mainly in Asian countries such as India, Malaysia, and Myanmar.

Moving forward, we will continue to utilize synergy generated by integration so that we can meet waterworks needs both in Japan and abroad, and aim to be a company deserving of strong praise and confidence.

▼ Company Overview

| | |
|----------------|--|
| Head office | 6-5-1 Nishi-shinjuku, Shinjuku-ku, Tokyo |
| Establishment | April 5, 2004 |
| URL | http://www.tokyowater.co.jp |
| Major business | Pipeline facility management Purification facility management Consulting and research Customer services IT services Other areas of business |
| Employees | 2,600 (as of April 2020) |
| Capital | 100 million yen |
| Sales | 14,759 million yen (TSS FY2019) 14,174 million yen (PUC FY2019) |

▼ Major achievements of overseas projects

| Country | Project details | Period |
|----------|-------------------------------------|-------------------------------------|
| India | Technical cooperation project | Jun. 2013 ~ Apr. 2018 |
| Myanmar | Non-revenue water reduction project | Oct. 2017 ~ Oct. 2024 (in progress) |
| Myanmar | Technical cooperation project | Jul. 2015 ~ Jun. 2021 (in progress) |
| Vietnam | JICA partnership program | Feb. 2016 ~ Jan. 2019 |
| Kenya | Non-revenue water reduction project | Sep. 2016 ~ Oct. 2021 (in progress) |
| Malaysia | JICA partnership program | Aug. 2017 ~ Mar. 2020 |



▲ Participating in overseas exhibition (the 8th IWA-ASPIRE)



▲ Training of the PVC pipe with rubber ring type joints connection (Myanmar)



▲ Coaching the techniques of leakage detection (India)

- Collaboration with private companies and related organizations -

■ Private Companies Support Program

Japan has many companies with cutting edge waterworks technology.

We run the Private Companies Support Program and promotes international expansion in collaboration with Japanese companies, in order to cooperate with developing countries sustainably and diversely according to their needs.

73 companies have registered with this program, as of February 2021.

● **Main Forms of Support**

Through the Private Companies Support Program, we perform the following support to registered companies.

(1) **Providing matching opportunities**

We provide matching opportunities to registered companies, responding to cooperation requests from overseas waterworks utilities.

(2) **Offering tours of our facilities**

Overseas waterworks utilities by application of registered companies.

(3) **Distributing information to overseas waterworks companies through a website**

We post information including profiles of registered companies and their technologies and products, on a website for overseas waterworks utilities*.

*We post information after confirming the intentions of registered companies.

(4) **Providing information on overseas waterworks situation**

We provide registered companies with information on local issues and needs, which we find through interviews with trainees conducted during their training in Japan.

The Bureau of Waterworks, Tokyo Metropolitan Government is recruiting a wide range of registered companies for the Private Companies Support Program. Please send inquiries about the Private Companies Support Program to the following email address.

[Contact] jimukyoku@waterworks.metro.tokyo.jp

■ Municipal Waterworks International Development Platform

A forum for discussion and arrangement for promoting international cooperation has been established by cooperation between 21 water utilities in Japan and the Japan Water Works Association, in which they have promoted mutual information sharing and opinion exchanges.

● **Main efforts**

- Promotion of knowledge sharing
- Discussion and arrangement for policy recommendation to the government and related organizations
- Provision of arrangement opportunities for mutual utilization of human resources
- Other activities that are necessary for international cooperation of water utilities

- Japan's Development Cooperation -

■ Development Cooperation Chapter

● **What is Development Cooperation Chapter**

The Development Cooperation Chapter shows the basic principles of Japanese development cooperation, and was approved by the Cabinet of Japan in 2015.

It states the following objectives and policies, with the aims of All-Japan cooperation including the private sector and local governments, expanding the scope of cooperation beyond official development assistance (ODA), and building reciprocal cooperation through equal partnerships with developing countries.

● **Objects of development cooperation**

- Japan will promote development cooperation in order to contribute to more proactively to the peace, stability and prosperity of the international community.
- Such cooperation will also lead to ensuring Japan's national interests such as maintaining its peace and security, achieving further prosperity, realizing an international environment that provides stability, transparency and predictability, and maintaining and protecting an international order based on universal values.
- ODA, as the core of various activities that contribute to development, will serve as a catalyst for mobilizing a wide range of resources in cooperation with various funds and actors and, by extension, as an engine for various activities aimed at securing peace, stability and prosperity of the international community.

● **Basic Principles**

- A. Contributing to peace and prosperity through cooperation for non-military purposes
- B. Promoting human security
- C. Cooperation aimed at self-reliant development through assistance for self-help efforts as well as dialogue and collaboration based on Japan's experience and expertise

■ Efforts by the Japan International Cooperation Agency (JICA)

JICA assists and supports developing countries as the executing agency of Japanese Official Development Assistance (ODA).



▲ JICA's vision

ODA Projects by the Japanese Government and Related Organizations

● JICA Partnership Program

This is a project that JICA executes as part of ODA in order to promote and encourage cooperative activities by Japanese NGOs and municipalities for local residents in developing countries.

▼ Past projects by Tokyo Waterworks (JICA Partnership Program)

| Period | Country (city) | Project Name |
|---------------------|--|--|
| Aug.2011 - Mar.2014 | Malaysia (Nationwide) Vietnam (Hanoi) | Strengthening capacities in terms of waterworks operations, management and maintenance |
| Jan.2014 - Nov.2016 | Malaysia (Penang) | NRW (Non-Revenue Water) Reduction Technology Training and Capacity Building Project in Malaysia |
| Feb.2016 - Jan.2019 | Vietnam (Hanoi) | NRW Reduction Technology Training and Capacity Building Project in Hanoi |
| Aug.2017 - Mar.2020 | Malaysia (Labuan Island) | The Training and Capacity Building Project of "Water Supply Control and NRW Management Technology" in Malaysia |

● Technical Cooperation Project

This is a project intended to contribute to socioeconomic development of developing countries, in which JICA sets up the purposes, details, scope, and term of the project in cooperation with recipient countries and flexibly selects the combination and size of project inputs (e.g. expert dispatch, trainee acceptance and equipment provision), and cooperation organizations.

▼ Past projects by Tokyo Waterworks (Technical cooperation projects)

| Period | Country (city) | Project Name |
|--|-----------------------|--|
| Jun.2013 - Apr.2018 | India (Delhi) | The Assistance related to Delhi Water Supply Improvement Project |
| Jun.2015 - Jun.2021 (Plan) | Myanmar (Yangon) | The Project for Improvement of Water Supply Management of Yangon City Development Committee |
| Sep.2010 - Nov.2014 Sep.2016 - Oct.2021 (Plan) | Kenya (Nairobi, etc.) | The Project for Management of Non-Revenue Water in Kenya The Project for Strengthening Capacity in Non-Revenue Water Management |

● Grand Aid

Grand Aid is financial cooperation provided to developing country governments mainly for the purpose of their development, with no obligation for repayment by those concerned.

The funding provided is used to purchase equipment, facilities and services that are required for plans that are conducive to socioeconomic development of developing countries and areas.

▼ Past projects by Tokyo Waterworks (Grant aid projects)

| Period | Country (city) | Project Name |
|---------------------|------------------|--|
| Oct.2014 - Mar.2015 | Myanmar (Yangon) | Non-Revenue Water Prevention Projects |
| 2016-2022 (Plan) | Myanmar (Yangon) | The Project of Reduction of Non-Revenue Water in Mayangone Township in Yangon City |

- City Diplomacy by Tokyo Metropolitan Government -

■ Basic Strategy for City Diplomacy

With the aim to clarify Tokyo's basic stance on city diplomacy and set policy direction, the Tokyo Metropolitan Government (TMG) compiled Tokyo's Basic Strategy for City Diplomacy in December 2014.

City Diplomacy to deliver a successful Tokyo 2020 Games and make Tokyo the world's best city

The TMG will strategically and comprehensively promote city diplomacy to achieve the following three goals.

1. Successful delivery of the Tokyo 2020 Games
2. Solving issues common to major cities
3. Making Tokyo a leading global metropolis

● Key Principles for City Diplomacy

- The TMG will strategically implement city diplomacy as an effective means to realize policies that will contribute to Tokyo's advancement.
- City diplomacy will be a TMG-wide endeavor undertaken comprehensively, with the aim of improving the lives of Tokyo residents and ensuring that the benefits gained will be enjoyed by them.
- The TMG's city diplomacy will be conducted in cooperation and collaboration with the central government and will contribute to the international community.

● Methods of Advancing City Diplomacy

- Building on the accomplishments achieved to date, the TMG will review and revitalize, and actively develop City-to-City and multilateral city diplomacy in Japan and abroad.
- Regular overseas visits by the governor and the heads of partner cities and others, the TMG aims to strengthen existing relations and build new relationships with 15 cities by 2017 and 30 cities by 2020.

Promotion of Strategic City-to-City Diplomacy

- The TMG will strategically select cities to build cooperative relationships with (e.g. host cities of past Olympic and Paralympic Games, major cities in Asia, advanced cities that place highly on various global city rankings, leading cities in emerging areas, and others).
- In areas of interest shared by both cities, the TMG will engage in practical cooperation and exchange that contributes to the advancement of its policies.
- The TMG will select the form of cooperation in a flexible manner (sister/friendship city, policy collaboration, etc).
- Written agreements will be concluded with important cities through reciprocal visits by the leaders of each city. Reciprocal visits will be carried out on a regular basis.

Implementation of Effective Multilateral City Diplomacy

- The TMG will promote multilateral working-level projects that contribute to solving problems shared by major cities in Asia and other regions and enhance cooperation and exchange.
- The TMG will actively support multilateral international conferences aimed at resolving issues. Tokyo will make earnest efforts to participate in, initiate, and hold conferences, attract international conventions, and promote the city at these events.

● Development of the Environment for Supporting City Diplomacy

- Implement improvements to enable the TMG to welcome dignitaries in a way befitting the world's best city
- Reinforce the framework for cooperation so that city diplomacy can be carried out as a TMG-wide effort
- Strengthen collaboration with the central government in areas such as contribution to the international community, etc.

- Major Facilities for Trainings in Japan -

■ Training and Technical Development Center

The Center is one of the largest facilities in Japan that provide waterworks training and carry out research and development.

With many facilities with which trainees can receive hands-on training of water pipe installation, leakage detection and water treatment, the Center offers an environment that allows the trainees to acquire practical skills related to waterworks techniques.



▲ Training and Technical Development Center



▲ Water examination



▲ Leakage repair



▲ Pipe connection work



▲ Leakage detection

■ Ogouchi Reservoir and Water Conservation Forest

The Ogouchi Reservoir (Okutama-machi, Tokyo) as specialized for water supply is the largest reservoir in Japan, which can hold up to 185.4 million m³ of raw water, equivalent to about 40 days' worth of water used in Tokyo.

As a Tokyo's independent water resource, the reservoir plays important roles in securing stable water supply for the citizens. For example, in times of drought and accidents, we increase water discharge from the reservoir.

Also, we own water conservation forest with the area of about 24,000 ha. The forest has functions of water resource recharge, water purification and soil runoff prevention, and plays important roles in securing stable river flow volume in the Tama water resource area and conserving the Ogouchi Reservoir.



▲ Water conservation forest



▲ Ogouchi Reservoir

■ Purification plants – various water purification methods that can deal with any water quality

There are 11 major purification plants in Tokyo, the total facility capacity of which is 6.86 million m³ per day. These plants have introduced the advanced water treatment using ozonation and biological activated carbon adsorption treatment, along with rapid sand, slow sand and membrane filtration methods. Also, we have a number of small purification plants in the Tama area.



▲ Ozone contact basin

▼ Outline of purification plants (As of March 2021)

| River System | Purification Plant | Capacity | Ratio (%) | | Water Treatment Method |
|------------------------------|--------------------|-----------------------|-----------|-----------|--|
| | | (m ³ /day) | by Plant | by System | |
| Tone River and Arakawa River | Kanamachi | 1,500,000 | 21.9 | 79.9 | Rapid sand filtration, Advanced water treatment (1,500,000m ³ /day) |
| | Misato | 1,100,000 | 16 | | Rapid sand filtration, Advanced water treatment (1,100,000m ³ /day) |
| | Asaka | 1,700,000 | 24.8 | | Rapid sand filtration, Advanced water treatment (1,700,000m ³ /day) |
| | Misono | 300,000 | 4.4 | | Rapid sand filtration, Advanced water treatment (300,000m ³ /day) |
| | Higashi murayama | 880,000 | 18.4 | | Rapid sand filtration, Advanced water treatment (880,000m ³ /day) |
| | 385,000 | | | | |
| Tama River | Ozaku | 280,000 | 4.1 | 17 | Rapid sand filtration |
| | Sakai | 315,000 | 4.6 | | Slow sand filtration |
| | Kinuta | 114,500 | 1.7 | | Membrane filtration, Slow sand filtration |
| | Kinutashimo | 70,000 | 1 | | Membrane filtration, Slow sand filtration |
| | Tamagawa | (152,500) | — | | Slow sand filtration, Rapid sand filtration |
| | | | | | |
| Sagamigawa River | Nagasawa | 200,000 | 2.9 | 2.9 | Rapid sand filtration |
| Ground Water | Suginami | 15,000 | 0.2 | 0.2 | Disinfection only |
| Total | | 6,859,500 | 100 | 100 | |

(note 1) Some of these facilities are decreasing in capacity due to deterioration.

(note 2) The Tamagawa purification plant is currently not in operation because of the deterioration of raw water and excluded from the production capacity. (Currently, the water is sent to the Misono purification plant for industrial waterworks.)

PR Facilities

● Tokyo Waterworks Historical Museum

Visitors can learn the relationship between people and drinking water in the Edo era, and the history of waterworks projects from modern times to the present day. Free audio guides in Japanese, English, Chinese and Korean are available.

● Tokyo Water Science Museum

Visitors can develop interests in water and water services while enjoying the hands-on exhibition equipment in the Museum.

● Okutama Mizu-to-Midori-no-Fureaikan

The Museum offers a simple introduction on the abundant nature, dam mechanism and importance of water of the Okutama area. Visitors can enjoy an exciting movie in the 3D theater.

Multilingual supports are available at these facilities so that we can help foreign visitors.



▲ Tokyo Waterworks Historical Museum



▲ Tokyo Water Science Museum



▲ Okutama Mizu-to-Midori-no-Fureaikan

International Cooperation of Tokyo Waterworks

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