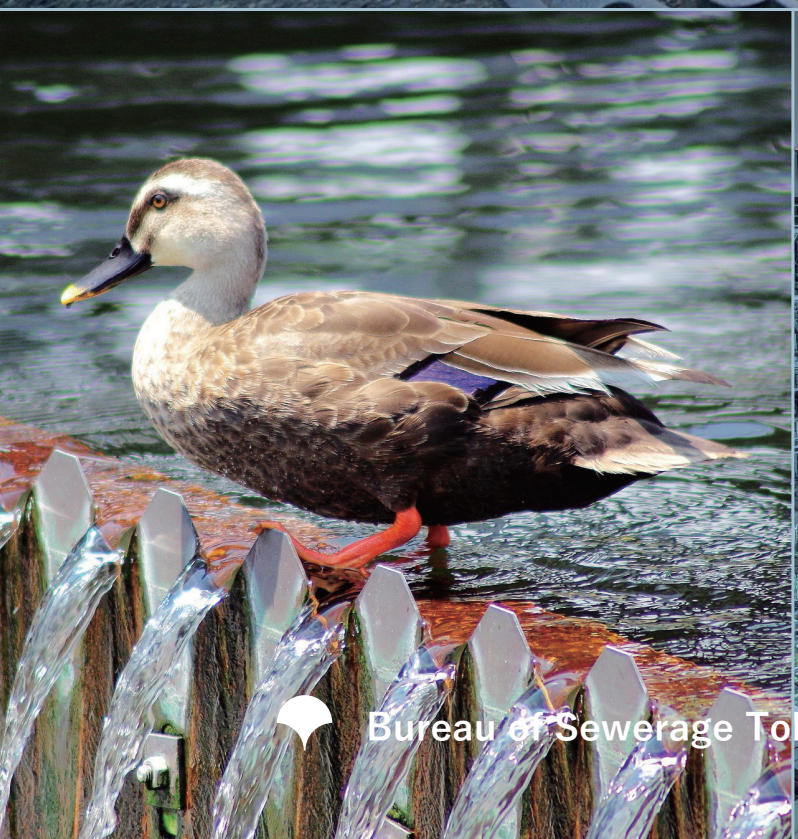
Tokyo Sewerage Systems

Sustainable Solutions for Global Challenges



Bureau of Sewerage Tokyo Metropolitan Government

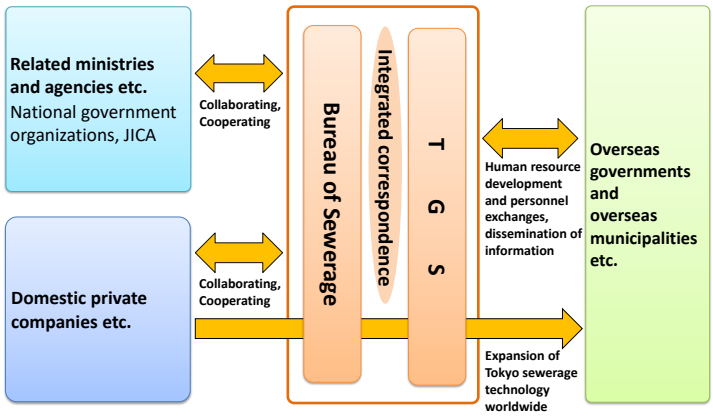
International Activities for the Tokyo Sewerage Systems

The Bureau of Sewerage, Tokyo Metropolitan Government and Tokyo Metropolitan Sewerage Service Corporation (TGS) are working together to contribute to sustainable development in Japan and overseas using “Tokyo Sewerage” technology.

In order to expand Tokyo Sewerage technology worldwide, we cooperate with related ministries, as well as other national government-related organizations such as Japan International Cooperation Agency (JICA) to promote human resource exchange and human resource development, and to further disseminate information.

We have been working on reconstruction of aging sewerage facilities, flood countermeasures, earthquake countermeasures in preparation for Tokyo inland earthquake and improvement of combined sewer system. In this process, we have developed technology for Tokyo Sewerage, and solved a variety of problems.

We will continue to solve problems on sewerage facility maintenance and business operation utilizing the strength of Tokyo Sewerage, including our advanced technical capacity and business management knowledge.



Scheme of international activities

Expansion of Tokyo Sewerage Technology Worldwide

We have various technologies used in Tokyo Sewerage on-site work that were jointly developed by the Bureau of Sewerage, TGS, and private companies, and we will work with these developers for promotion of these technologies worldwide.

We will contribute to solving problems in countries and regions where sewerage facilities have not yet been developed or whose functionality is yet underdeveloped by using knowledge of construction, maintenance, and management of sewerage facilities, as well as business operations of sewerage systems, in cooperation with JICA and other related organizations.

Promoting Personnel Exchanges

Through personnel exchanges, which include actively accepting tour groups and trainees from national and local governments all over the world, as well as dispatching our own staffs overseas, we will spread and provide the technology and know-how of Tokyo Sewerage, and strengthen our international network.

Promotion of Human Resource Development, and Further Enhancement of Information Dissemination

For human resource development, we will further promote the participation of our staffs in international conferences, etc. with the aim of accumulating international knowledge and experience. As a result, we will raise staff's awareness toward international communities, leading to further international activities.

We will actively participate in major international conferences, exhibitions, trade fairs, etc. in the field of water environment, in order to raise the presence of Tokyo Sewerage.

Explanation of the title picture

Upper row: Tokyo Metropolitan Government Buildings and manhole cover

Lower left: Secondary sedimentation tank (Shibaura Water Reclamation Center)

Lower right: Sludge treatment facilities (Minami-Tama Water Reclamation Center)

Tokyo Sewerage Technology and Know-how

The Tokyo Sewerage system has a history of more than 130 years. In that time, we have solved many difficult problems with our technological capabilities and have supported the lives of residents and urban activities in Tokyo, the capital city of Japan where urban functions are highly concentrated.

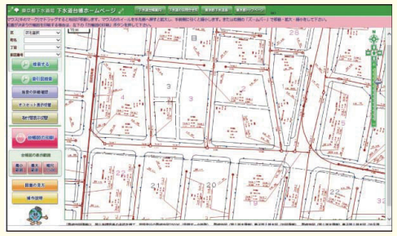
Efficient and Stable Maintenance Technology

In order to keep our massive facilities operating twenty-four-seven, we conduct appropriate operations, as well as facility maintenance and inspections, and water quality tests.

We are working to extend the useful lives of facilities by carrying out maintenance with a focus on preventive maintenance, such as by making planned repairs.

SEMIS (Sewerage Mapping and Information System)

SEMIS is a system that manages the locations, sizes, and depths of sewers as well as the locations of manholes and house inlets in Tokyo's 23 wards. They can also be looked up using the Bureau of Sewerage website.



Mirror TV camera

This camera can capture detailed 360-degree images of the inner surface of a sewer, just by advancing straight through the pipe. It is used for surveying small-diameter pipes where it is difficult to get inside

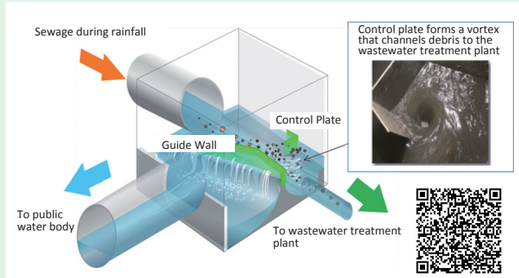
Improvement of Combined Sewer System

About 80% of the 23 wards of Tokyo are on combined sewer system.

In order to reduce the pollution loading amount discharged from the combined sewer system to rivers and the sea during rainfall, we are working to develop facilities that store particularly contaminated sewage in the early stages of rainfall.

Water Surface Control Device

This device can remove more than 70% of debris that flows out from a combined sewer system into rivers and the sea when it rains. A water level control plate is installed at the entrance of the pipe which sewage flows into from the rainwater discharge chamber, and a guide wall is installed in front of the overflow weir to induce vortex currents, so debris is guided to a pipe that flows into the wastewater treatment plant. The device is easy to install, and there are no moving parts, so it is possible to maintain efficiently. Furthermore, it does not require power, so it is inexpensive and contributes to energy saving measures.
As of end of March 2023, this system has been installed in 41 locations including Germany and other regions in Europe, etc.



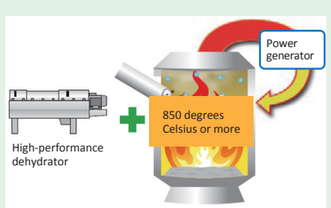
■ Outstanding Civil Engineering Award for "Environment" (2020)
■ 4th MLIT (Ministry of Land, Infrastructure, Transport and Tourism) Minister's Prize: "Passage of Circulation, Sewerage Award (Special Category) " (2011)

Energy Management and Global Warming Countermeasures

In order to reduce greenhouse gas emissions and energy use in the wastewater treatment process, we are actively promoting introduction of energy-saving equipment, improving the efficiency of treatment processes and methods, and utilizing renewable energy.

Features of the energy neutral incineration system

Dinitrogen oxide emission is reduced by raising the incineration temperature to over 850 degrees Celsius.
Combination with high-performance dehydrator makes fuel unnecessary.
The incinerator itself generates the power by utilizing waste heat.



Utilizing the Potential of Sewerage System

We are creating better urban environments by effectively utilizing the resources and energy that sewer provides, such as wastewater heat and reclaimed wastewater.

Wastewater Heat Exchangers

The temperature characteristics of sewage, which is cooler than air temperature in summer and warmer than air temperature in winter, means we can use it as a heat source for heating and cooling.

Reconstruction of Facilities

In the wards area of Tokyo, approximately 20% of the total length of sewer pipes have already exceeded their legal service life (50 years). A large portion of the sewer pipes laid during the high economic growth period and thereafter will reach the end of its service life around the same time. If reconstruction is not conducted, aging pipes will constitute approximately 29% in five years and approximately 65% in twenty years, respectively from FY2021, marking a rapid increase.
We are systematically and efficiently engaged in rebuilding aging facilities using the asset management method*.

*Asset management method: This is the method that systematically and efficiently manage assets while evaluating the state of the facilities, conducting appropriate maintenance, and considering the life cycle cost and the leveling of reconstruction business in mid-to long-term.

SPR Method

SPR stands for Sewage Pipe Renewal. With this construction method, a PVC profile is wrapped around the inner surface of old sewer pipes for renewal. Construction can be done while wastewater is flowing, without digging up roads. It can be used for various cross-section shapes, including circular pipes, horseshoe-shaped culverts, and even rectangular culverts.
As of end of March 2023, this work has been performed on a total of approx. 181 km of sewer in Asia, North America, Europe, and elsewhere abroad.

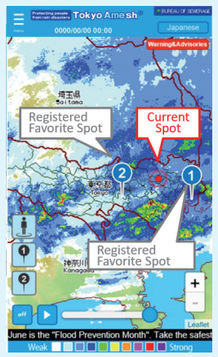
■ Good Design Award (2013)
■ Okochi Memorial Prize (2013)
■ 1st METI (Ministry of Economy, Trade and Industry) Minister's Monodukuri Nippon Grand Award (2005)

Flood Control

In order to respond to disasters caused by heavy rain, which occur frequently in Japan in recent years, we are taking both tangible and intangible measures.
We have built large-scale rainwater storage facilities and provided customers with real-time rainfall information with the rainfall information system "Tokyo Amesh".

Tokyo Amesh

Using rainfall radar and surface rainfall gauges, we measure rainfall and display the degree of intensity on a 10-level system.



High Head / Large Diameter Pump

In order for more reliable rainwater removal at pump stations with a depth of about 50 meters, we developed waterless standby pump capable of handling high heads and large diameters.

Wada-Yayoi Trunk Sewer

A rainwater storage pipe built using the shield method

<Facility Scale>
Diameter: 8.5 m
Length: approx. 2.2 km
Storage Capacity: approx.150,000 m³

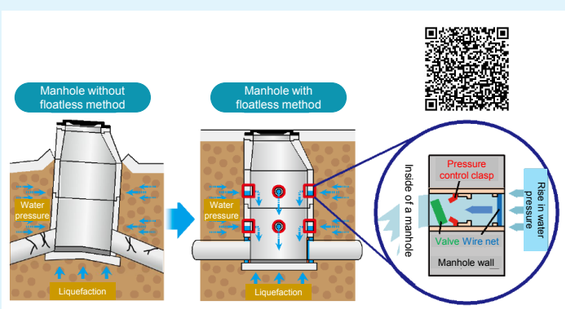
Countermeasures for Earthquake Disaster

Multiple tectonic plates apply complex forces to the area around Japan, making it one of the most earthquake prone countries in the world.
Earthquake and liquefaction* countermeasures at sewerage facilities are promoted using methods of building earthquake-proof pipes to ensure that sewerage functions as well as emergency transport routes and other transportation functions are maintained even after powerful earthquake tremors.

*Liquefaction is a phenomenon that the ground becomes liquid form during an earthquake.

Floatless Method

Excessive water caused by liquefaction is released into the manhole in order to reduce surfacing and ensure the downward flow of sewage. With this method, valves are installed within the manhole. When underground water pressure rises due to liquefaction caused by an earthquake, valves automatically come off, allowing ground water to flow into manholes. Installation can be done at high speed and low cost without digging up roads. Once installed, the valves will not interfere with sewer pipe maintenance and management.
As of the end of March 2016, there has been a test implementation of this method conducted in New Zealand.



■ Outstanding Civil Engineering Award for "Technological Development" (2013)

Major Achievements

United Kingdom

May 2019
Established the UK's first ever Water Surface Control Device (WSCD), and conducted a demonstration that adds a mechanical screen (Photo1)

Photo1: Mechanical screen status before and after installation

2

Belgium

2

France

4

28

22

Elsewhere in Europe

SPR method deployed in Germany, Poland, etc.

Germany

June 2010
Signed a licensing agreement with Steinhardt GmbH for WSCD

May 2014
Signed a letter of intent with Steinhardt GmbH to Perform a test performance evaluation of WSCD with the aim of spreading them further throughout Europe

May 2018
Signed a memorandum of understanding with Steinhardt GmbH on joint research with the aim of further spreading WSCD throughout Europe

October 2018
Signed a licensing agreement with Steinhardt GmbH for WSCD

India

November 2010
Visited India as a member of the Tokyo Waterworks Missions for International Development

May 2011
Worked on part of the Project Commissioned to Research and Promote Infrastructure-related System Exports [Ministry of Economy, Trade and Industry]

Mongolia

April 2012
Created the Strategic Plan for the Water Supply and Sewerage Sector in Ulaanbaatar City [Project supported by JICA]

January 2019
Dispatched staffs to conduct a survey on industrial wastewater countermeasures in Ulaanbaatar City [JICA investigation team]

November 2019
Dispatched staffs to conduct a management guidance survey pertaining to efforts to improve the safety of the central wastewater treatment plant in Ulaanbaatar City [JICA investigation team]

March 2023
Adopted JICA Partnership Program (The capacity building project for maintenance, management and renewal of sewer pipes for USUG)

South Korea

July 2010
Signed a licensing agreement with N4TEC DS for WSCD

5

Japan

September 2018
11th IWA World Water Congress & Exhibition held in Tokyo (Photo2)

Photo2: 11th IWA WWCE 2018 Japan Pavilion

North America

SPR method deployed in Los Angeles and other cities

20

United States of America

October 2023
Set up a booth at the 96th Water Environment Federation's Technical Exhibition and Conference (WEFTEC2023) in New Orleans

Bangladesh

October 2022
Signed an Understanding of technical cooperation with the Dhaka Water Supply and Sewerage Authority (DWASA) and the Asian Development Bank (ADB) at the request of DWASA through ADB.

Myanmar

September 2016
Worked on part of the Sewerage System Improvement Plan Survey in Yangon City (Project to Promote Overseas Deployment of Quality Energy Infrastructure Systems) [Ministry of Economy, Trade and Industry]

Indonesia

June 2016
Attended meetings held between the governments of Japan and Indonesia in the Special Capital Region of Jakarta

February 2017
Attended the Japan-Indonesia Senior Construction Officials meeting in the Special Capital Region of Jakarta

Malaysia

March 2011
Proposed a master plan for Malaysia-wide water supply and sanitation system[Project supported by the Ministry of Economy, Trade and Industry]

June 2012
Proposed a model project that covered everything from construction to maintenance [Project supported by JICA]

July 2012
Conferences and workshops held between Japanese and Malaysian governments [Ministry of Land, Infrastructure, Transport and Tourism and Ministry of Foreign Affairs]

October 2014
A contract regarding the Malaysia Sewerage Development Project is agreed by the Malaysian government

July 2017
Training sessions began in Tokyo via JICA Partnership Program (training program ended Sep. 2018)

September 2020
A comprehensive test run of the wastewater treatment plant has been completed (Photo3)

November 2022
The Malaysia Sewerage Development Project has been completed

133

Other areas in Asia and Southeast Asia

Deployed the SPR method in Singapore, South Korea, Taiwan, etc.

Compact Wastewater Treatment Plants adopted in "Malaysia Sewerage Development Project"

In crowded cities like Tokyo, it is not easy to secure large plots of land required for wastewater treatment.
By making **deep reaction tanks** that are twice as deep as typical reaction tanks, the necessary land area can be reduced by half, and contamination in wastewater can be removed more efficiently.

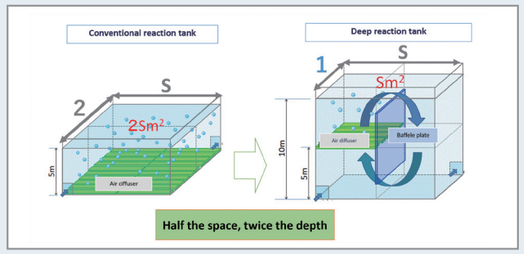


Photo3: Langat wastewater treatment plant

3

New Zealand

November 2013
Wellington Region and others visit Japan to inspect Tokyo sewerage facilities

August 2014
Trial implementation of the floatless method in Porirua, Wellington Region

South America

SPR method deployed in Argentina and elsewhere

6

Legend

- International infrastructural development project
- SPR method
  *The number in the shape is the length implemented (km)
- Water Surface Control Device (WSCD)
  *The number in the shape is the number of installation locations
- Floatless method
  *The number in the shape is the number of installation locations
- International conference

Facility tours of Water Reclamation Center

There are 20 water reclamation centers in Tokyo, each with its own characteristics. For details about facility tours, please visit the Tokyo Sewerage website. You can also make reservations.
We have renovated tour facilities at Shibaura and Ariake Water Reclamation Centers, and have also started virtual facility tours.

Virtual Facility Tours

VR Tours of Tokyo Sewerage System

This application uses virtual reality (VR) technology to simulate a visit to Tokyo's sewerage facilities in a 360-degree experience that responds to the viewer's gaze.

Contact and Homepage

Planning and International Affairs, Planning and Coordination Section, General Affairs Division, Bureau of Sewerage, Tokyo Metropolitan Government
2-8-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo 163-8001 Japan
TEL: +81-3-5320-6641
E-mail: S0821021@section.metro.tokyo.jp
Homepage : https://www.gesui.metro.tokyo.lg.jp/index.html

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