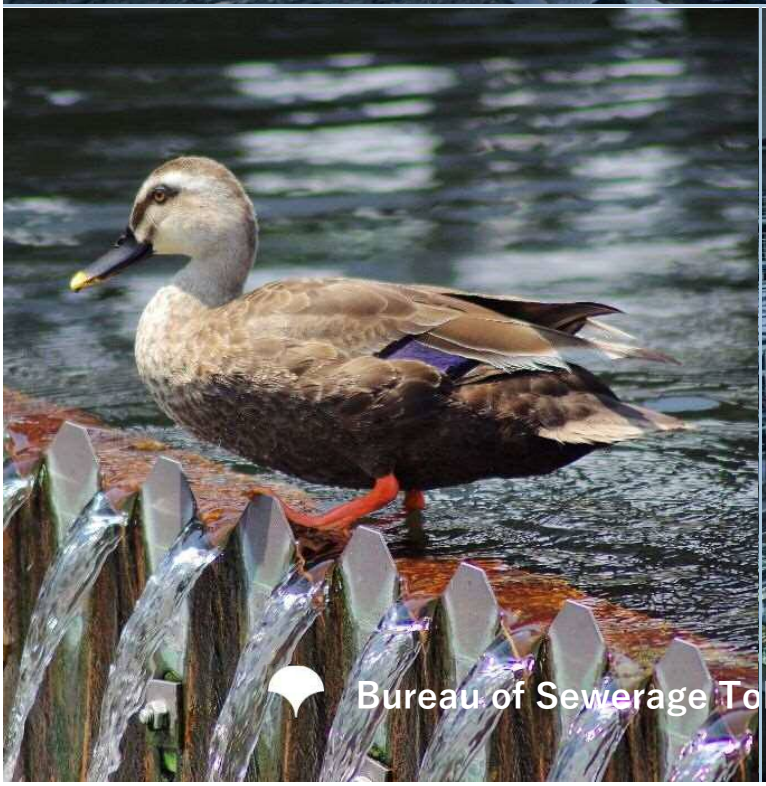
Tokyo Sewerage Systems

Sustainable Solutions for Global Challenges



Bureau of Sewerage Tokyo Metropolitan Government

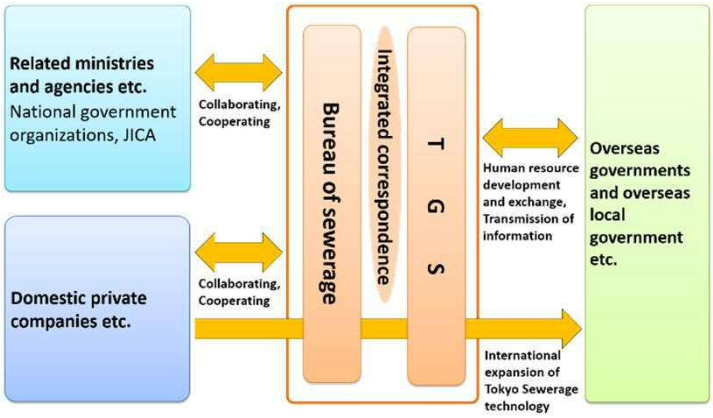
International development activities for the Tokyo sewerage systems

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

In order to promote international expansion of Tokyo Sewerage technology, we are collaborating and cooperating with related ministries and agencies, such as Japan International Cooperation Agency (JICA), as well as other national government organizations to promote human resource exchange and human resource development, and to further enhance information distribution.

We have been working to rebuild aging sewer facilities, and promote flood countermeasures, as well as earthquake countermeasures in preparation for earthquakes predicted to strike directly under the Tokyo metropolitan area and improvements in the combined sewer systems. As part of that process, we have created technology for Tokyo Sewerage, and solved a variety of problems.

We will continue to leverage the strength of Tokyo Sewerage, including our advanced technical capacity and management knowhow, in order to sustainably solve problems such as sewer facility maintenance and business operation.



Scheme of International development activities

International development activities for Tokyo's sewerage technology

We will contribute to solving problems such as improving functionality by utilizing various technologies commonly employed by Tokyo Sewerage, which have been developed through joint research with private companies, as well as knowhow related to facility maintenance and business operation.

Promoting of overseas infrastructure development projects

We provide technical support such as by proposing sewer improvement plans according to the needs of each country and region, and contribute to improving the water environment.

- The Malaysian Sewer Development Project uses Tokyo Sewerage technologies, including centralized sewage treatment and sludge treatment, and compact treatment plants with deep reaction tanks.
- Utilizing JICA's "Grassroots Technical Cooperation Projects", we conducted human resource development training for engineers in Malaysia. Around the world, we are promoting training for engineers who will lead the next generation in water environment conservation.

Further enhancing information distribution, promoting personnel exchanges

We are actively conducting promotions at major international conferences, exhibitions, trade fairs, etc. in the field of water environment both in Japan and overseas, in order to raise the prominence of Tokyo Sewerage.

Through personnel exchanges, which include accepting tour groups and trainees from foreign national and local governments, as well as dispatching our own staff overseas, we will popularize and provide the technology and knowhow of Tokyo Sewerage, and strengthen our network abroad.

Explanation of the title picture

Upper row: Tokyo Metropolitan Government Building No. 1 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 Knowhow

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

Stable and Efficient Maintenance Technology

In order to keep our massive facilities operating 24 hours a day, 365 days a year, 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 doing 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 sewer pipes 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 the sewer pipe.

Improvement of Combined Sewer system

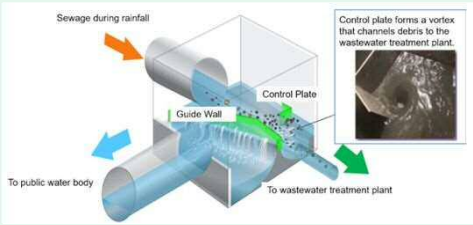
About 80% of the 23 wards of Tokyo are on combined sewer systems.

In order to reduce the pollution loading amount discharged from the combined sewer system to rivers and the sea when there is rain, 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 the garbage that flows out from a combined sewer system into rivers and the like when it rains. A water level control plate is installed at the entrance of the pipe where sewage flows out from the rainwater discharge chamber, and a guide wall is installed in front of the overflow weir to induce eddy currents, so garbage is guided to a pipe that flows out to the wastewater treatment plant. The device is easy to install, and there are no moving parts, so it is possible to do maintenance efficiently. Furthermore, it does not require power, so it is inexpensive and contributes to energy saving measures.

As of the end of March 2020, this system has been installed in 34 locations in Germany and Europe.



- 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 gases emitted and energy used 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-independent incineration system

Higher incineration temperatures by further reducing moisture content in sludge via an ultra-low moisture content dehydrator.

Reduces nitrous oxide by about 50 percent and makes auxiliary fuel unnecessary.

The incinerator itself generates the energy it needs by utilizing waste heat.

Utilizing the potential of sewerage system

We are creating better urban environments by effectively using the resources and energy that sewers provide, such as wastewater heat and recycled water.

Sewage 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

Facilities initially constructed in the wards area of Tokyo are now aging, with over 1,800 kilometers of sewer pipes already exceeding their legal service life of 50 years.

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

With this construction method, a PVC profile is wrapped around the inner surface of an existing sewer pipe to rehabilitate that sewer pipe. 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 the end of March 2020, this work has been performed on a total of approx. 159 km of sewer in Asia, North America, Europe, and elsewhere.

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

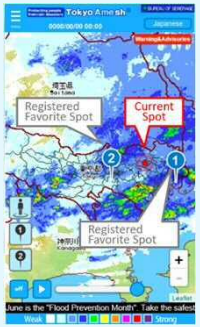
Flood Control

In order to respond to disasters caused by heavy rain, which occur frequently in Japan in recent years, we are taking both soft and hard measures.

We have built large-scale rainwater storage facilities and provide 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 Lift / Large Diameter Pump

In order to do more reliable rainwater removal at pump stations with a depth of about 50 meters, we have developed a non-injection type preceding standby pump capable of handling high lifts and large diameters.

Wada-Yayoi Trunk Sewers

Rainwater storage pipes built using the shield method

<Facility Scale>

Diameter: 8.5 m

Length: approx. 2.2 km

Storage Capacity: approx.150,000 m^3

Countermeasures for earthquake disaster

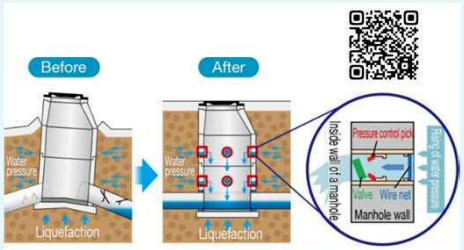
Multiple tectonic plates apply complex forces to the area around Japan, making it one of the most earthquake prone countries in the world.

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.

Floatless Method

Excessive water pressure caused by liquefaction is released into the manhole in order to reduce surfacing and ensure the downward flow of sewage. With this method, a valve is installed within the manhole. When groundwater pressure rises during an earthquake, this valve automatically disengages and takes groundwater into the manhole. Construction can be done quickly and inexpensively from inside the manhole, without digging up the road. It will not interfere with maintenance of sewer systems, even after construction.

As of the end of March 2020, there has been a test implementation of this method conducted in New Zealand.



- Outstanding Civil Engineering Award for "Technological Development" (2012)

Major Achievements

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

Photo1: Mechanical screen status before and after installation

Mongolia
April 2012
Created the Strategic Plan for the Water Supply and Sewerage Sector in Ulaanbaatar City
January 2019
Dispatched staff to conduct a survey on industrial discharge countermeasures in Ulaanbaatar City [JICA investigation team]
November 2019
Dispatched staff 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]

Elsewhere in Europe
SPR method deployed in Germany, Poland, etc.

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]

South Korea
July 2010
Signed a licensing agreement with N4TEC DS for Water Surface Control Device

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

United States of America
September 2019
Booth at the 92nd Water Environment Federation's Technical Exhibition and Conference (WEFTEC2019) in Chicago

Elsewhere in Asia and Southeast Asia
Deployed the SPR method in Singapore, South Korea, Taiwan, etc.

Germany
June 2010
Signed a licensing agreement with Steinhardt GmbH for Water Surface Control Device (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 Water Surface Control Device throughout Europe
October 2018
Signed a licensing agreement with Steinhardt GmbH for Water Surface Control Device

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 the Japanese and Malaysian governments [Ministry of Land, Infrastructure, Transport and Tourism and Ministry of Foreign Affairs]
October 2014
The Malaysian government agree to a contract regarding the Malaysia Sewerage Development Project
July 2017
Training sessions begin in Tokyo via the Grassroots Technical Cooperation Projects (training program ended Sep. 2018)
September 2020
A comprehensive test fun of the wastewater treatment plant has been completed.(Photo3)

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
February 2016
Attended the Japan-Indonesia Senior Construction Officials meeting in Tokyo
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

New Zealand
December 2012
Signed a licensing agreement for the floatless method with HYNDS
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

Legend

- International infrastructural development project
- SPR method *The number in the shape is the length implemented (km)
- Water Surface Control Device *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

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.

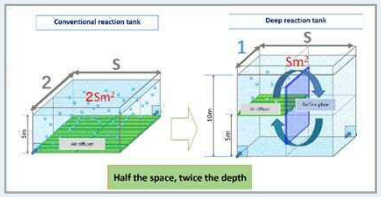



Photo3: Langat Wastewater treatment plant

Facility tours of Water Reclamation Center

There are 20 water reclamation centers in Tokyo, each with its own characteristics. For details such as how to tour these facilities, please visit the Tokyo Sewerage website. You can also make reservations for 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

International Affairs, Finance 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 FAX: +81-3-5388-1700
E-mail: Tokyo_Sewerage_International_Activities@section.metro.tokyo.jp
Homepage (English) : https://www.gesui.metro.tokyo.lg.jp/english/index.html

E-mail
Homepage

Tokyo Sewerage Systems: Sustainable Solutions for Global Challenges
令和３年３月発行　令和２年度規格表第４類登録第144号
編集・発行　東京都下水道局総務部理財課　所在地　〒163-8001　東京都新宿区西新宿二丁目８番１号　電話　03-5320-6641