Summary

Technical Research & Development Promotion Plan -2008

Pumping station in the old Mikawashima wastewater treatment plant (Important national cultural asset)

July 2008

Bureau of Sewerage, Tokyo Metropolitan Government

Features of "Technical Research & Development Promotion Plan -2008"

(1) Reinforcement of countermeasures against global warming: Future approaches are indicated, with attention focused on the "countermeasures against global warming," an imminent global urgency in order to materialize the "Earth Plan -2004" and the "Tokyo 10-year Project for Carbon Reduction."

(Examples of future approaches)

・Development of technology for reducing the greenhouse gas (N_2O) from the sludge incinerator using catalyst.

・Development of technology for utilization of natural energy with no emission of greenhouse gas, such as solar energy, etc.

(2) Reinforcement of the cooperation with industrial, academic and public sectors: Different ways of cooperation including joint research, etc. are indicated in line with the policies of cooperation with industrial, academic and public sectors as proposed in the "Tokyo Government Industrial Science Technology Promotion Guideline <2nd term>."

(3) Effective utilization of "Sewerage Technical Research and Development Center": Reinforcement of joint research and development with private and academic sectors shall be promoted through effective utilization of the "Sewerage technical Research and Development Center" established in "Sunamachi Water Reclamation Center" in July 2008.

Plan draw-up Principle

・Technical research & development bears the role and significance of maintenance and improvement of sewerage system by solving the imminent problems and by carving out a new future to get fully prepared for solving the future problems, while paying due attention to the possible future problems.

・Technical research & development leads to the reinforcement and growth of industrial power in addition to the source of vitality in sewerage works such as succession of technology, cultivation of human resources since the problems are solved through combination of technologies from various fields related to the sewerage works.

Objectives of Plan Draw-up

・The plan is drawn to provide information in large scale about the aimed direction of the future technical research & development and the needs of technical research & development experienced by the Tokyo Bureau of Sewerage, so as to promote cooperation with industrial, academic and public sectors across a wide range of fields, contributing to the accomplishment and promotion of the objectives (targets) of the "Management Plan -2007" and the other related plans.

The plan is drawn up to indicate the systematic pattern of the future technical research & development and to promote in a planned manner the technical development, with eyes set on the future.

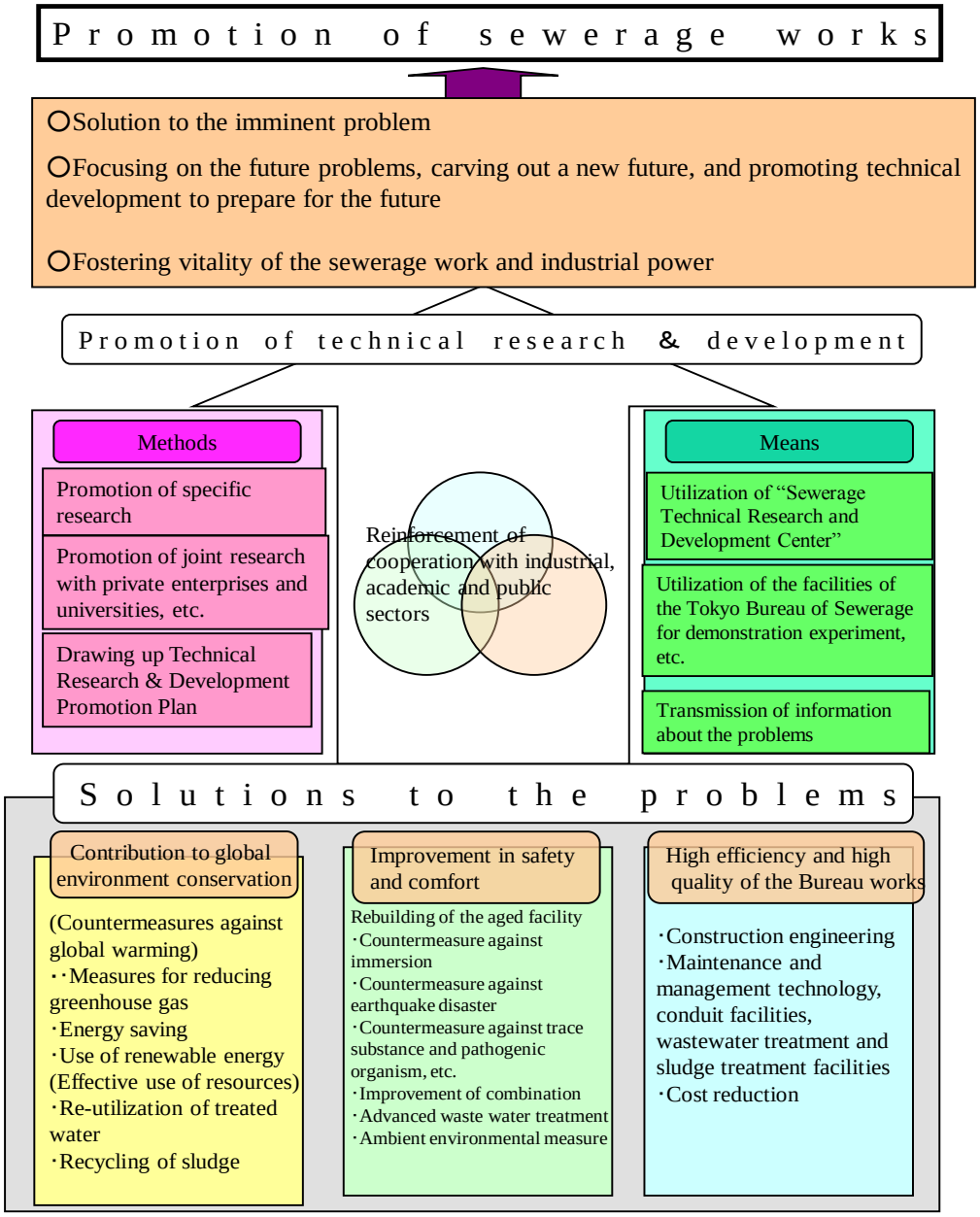


Image of Sewerage Technology Development Promotion Program for finding the solutions to problems

Technical Research & Development Promotion Measures

The current global environment problems are complexly inter wined with such problems as global warming that accompanies other problems related to water, food, energy, etc.
In order to solve such new problems it is important to muster up the mutual efforts and wisdom across the industrial, academic and public sectors in developing and introducing new technologies. We, on our part, take the initiative on promoting cooperation with industrial, academic and public sectors.

Technical Research & Development Methods

We adopt two methods for technical development: joint research based on the cooperation with industrial, academic and public sectors and special research carried out independently by the Bureau.

	Content	Significance
Joint research	Joint research with private enterprises, universities, etc.	・Effective promotion of technical development through combination of the advanced technologies of the private enterprises and the sophisticated know-how of Tokyo Sewerage Bureau. ・The Bureau's partial support contributes to the promotion of the research and development of sewerage as well as of the reinforcement of the industrial power
Independent research	Research carried out directly by the Bureau or through consignment to consultants, etc.	・Research and development is carried out in accordance with the needs of the Bureau. ・Technical development not likely to be taken up by private enterprises or research not likely to be conducted by universities are carried out by the Bureau.

There are three patterns of joint research as shown in the table below.

Joint research	Topic proposer	Cost burden of research	content
Open-type	Sewerage Bureau	Bureau & private enterprise	Tokyo Sewerage Bureau comes up with the topic of research, evaluates and selects the enterprise for research from the applicant private enterprises.
Know-how + field offer type	Private enterprise	Private enterprise	・Private enterprise proposes at research and development stage, bringing commercialization into view. ・The Bureau provides the know-how, site and facilities in addition to the experimental materials such as sewage (wastewater), etc.
Simple offer type	Private enterprise	Private enterprise	・The test and research stage of the private enterprise and the technology involving simple skill and improvement and ending in less than one year. ・The Bureau provides the know-how, site and facilities in addition to the experimental materials such as sewage, etc.

Cooperation with Industrial, Academic and Public Sectors

We would like to mention below the methods of cooperation with industrial, academic and public sectors as a concrete process of development and introduction of new technology

●Cooperation with private enterprises:

・The private enterprises can avail themselves of the opportunity of conducting demonstration experiment by using real sewerage facilities through the joint research and development, etc.

●Cooperation with universities

・ The joint research with the universities involves highly academic and basic research.

●Cooperation with local governments and related organizations:

・The problems of each local government are jointly solved through Technical Development Communications Conferences (for ordinance-designated cities).

・Cooperation is promoted with National Institute for Land and Infrastructure Management (NILIM) and Japan Sewerage Works Agency through dispatch of personnel and exchange of information, etc.

●Cooperation with other Bureau in Tokyo metropolitan government

・Efforts are made to solve the problems through cooperation with different Bureaus.

●Cooperation with Management Organizations of Tokyo Metropolitan Government:

・The Tokyo Gesuido <Sewerage> Service (TGS) Corporation dealing with our semi-core business carries out field-based technical development in cooperation with the medium-and small-size full-time sewerage companies.

・We are making study to find out a new method of joint research and development with TGS in the future.

Sewerage Technical Research and Development Center

Since the sewerage works are exclusively operated and managed by the local governments, the research institutes belonging to private enterprises and universities have fewer chances of conducting experiments and verification tests using the actual fields. Hence, the "Sewerage Technical Research and Development Center," established as a base for technical research and development, is effectively used to promote technical development program through cooperation with private enterprises and universities.

The Sewerage Technical Research and Development Center was established in Sunamachi Water Reclamation Center in July 2008 as a new development base to carry out integrated technical development for wastewater treatment and sludge treatment.

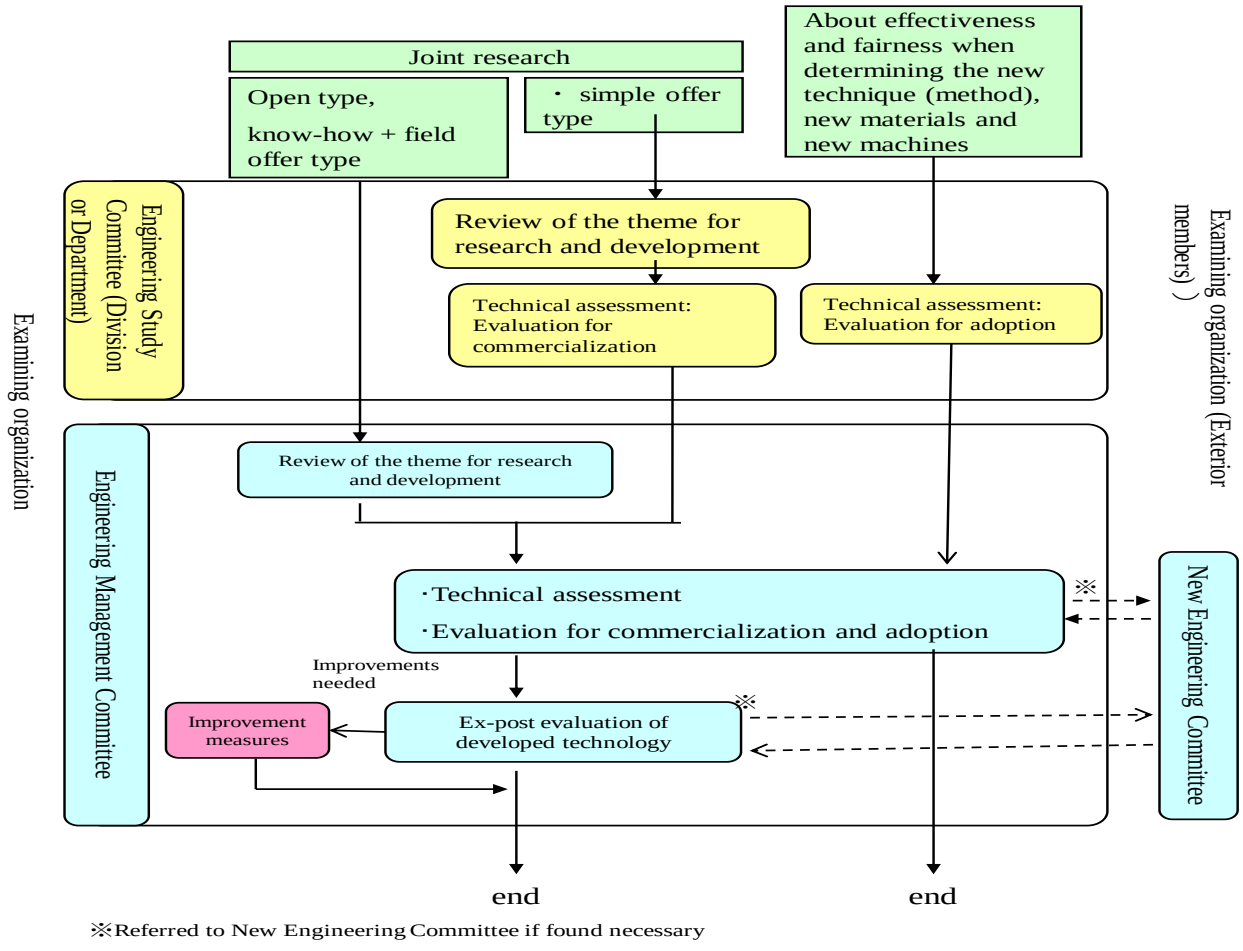
Flow of Technical Research & Development Assessment,

In introducing the newly developed technology or new methods and machines, the Technology Assessment System is appropriately used, with the assessment of the result after using the new technology and ex-post evaluation carried out by exterior council members.

・The Engineering Management Committee or the Engineering Study Committee (set up in Divisions or Departments) examines the effectiveness and fairness at the time of evaluation of the newly developed technology and when determining the use of the new technique, new materials and new machines.

・The Engineering Management Committee carries out final technical assessment before commercialization and adoption of the newly developed technology, etc. (When approved necessary by the Engineering Management Committee, the case is referred to the "New Engineering Committee.")

・The commercialized newly developed technology is put to ex-post verification before being subjected to improvements if necessary.

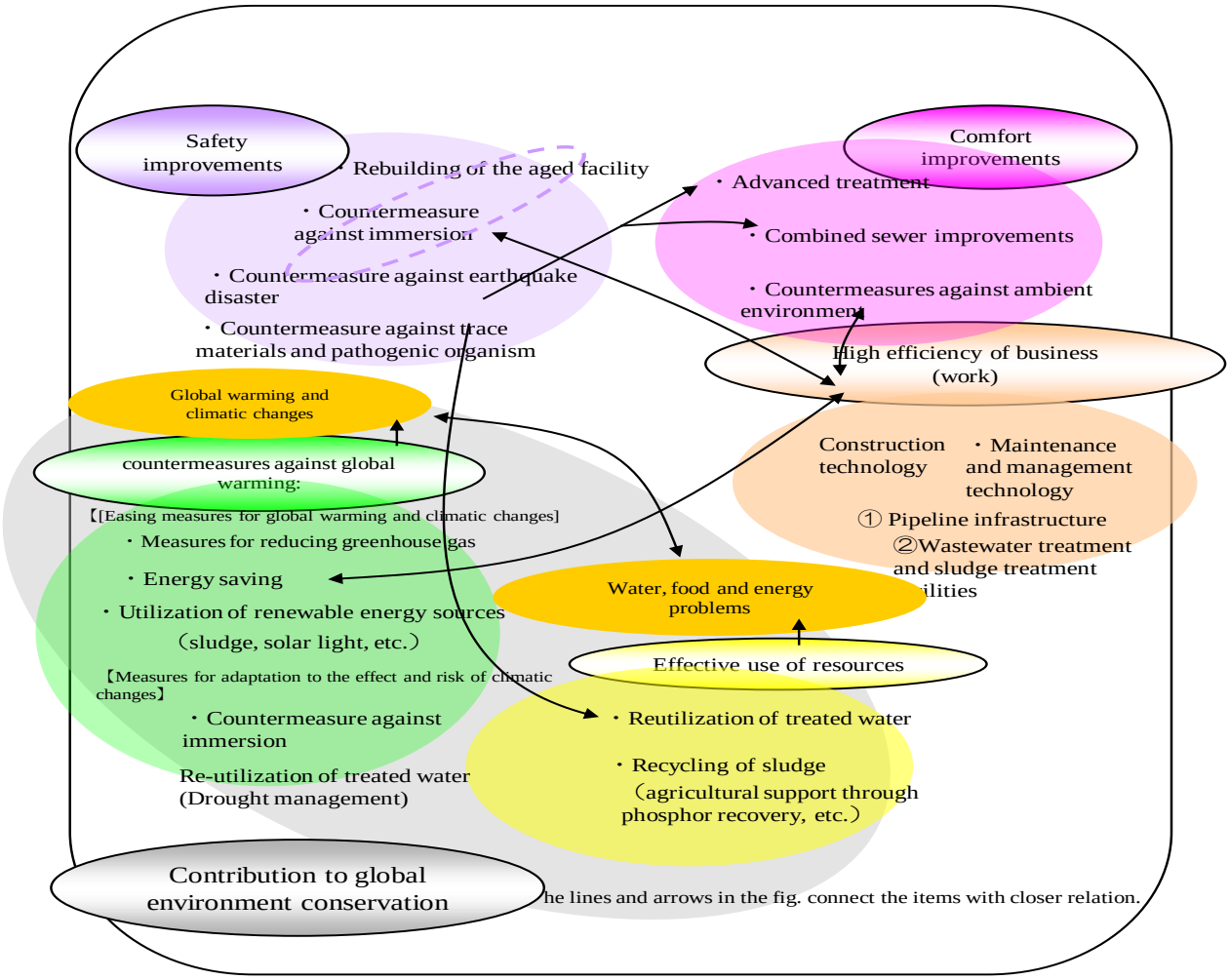


Flow of assessment of newly developed technology, etc.

Technical Research & Development Themes and Future Measures

In order to promote effective technical development, the systematic classification and organization of the themes for technical development as well as the transmission of the information is necessary as the comprehensive needs of technical development.

Further, it is also necessary to take account of the themes that are currently not so important but may prove promising in long-term basis. Therefore, the technical development themes are selected, taking into account of the related technologies of "Management Plan -2007" and the needs of technical development in the Bureau.

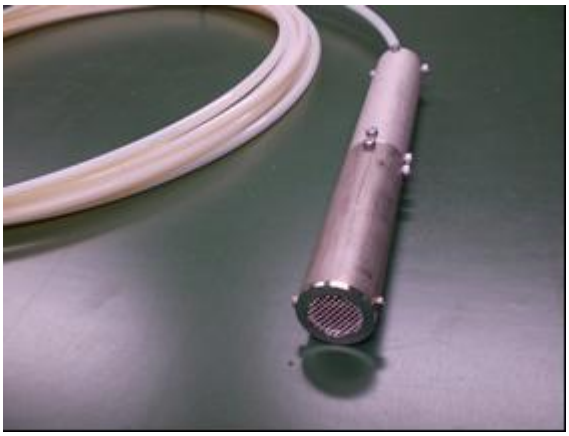


Mutual relationship among technical development themes

Safety Improvements

Field	Measures so far taken	Future measures
Rebuilding technology	Development of technology for rehabilitation of the aged pipes through non-open cut method, etc.	Ex-post evaluation of the camera system for examining the large-caliber pipe
Immersion countermeasure technology	Drawing up a manual for utilization of rainwater-runoff analytical model, etc.	Development of cheap detecting technique of water level inside the pipe using optical fiber, etc.
Earthquake disaster countermeasure technology	Development of earthquake resistance improving and seismic reinforcement technologies for pipes and facilities, etc.	Follow-up study of the technology for preventing the manhole from getting afloat due to soil liquidation, etc.
Technology for countermeasures against trace substance and pathogenic substance, etc.	Reality check of the trace substance and pathogenic substance in sewerage, etc.	Development of wastewater treatment technology to reduce the risk of the trace substance, pathogenic substance, etc.

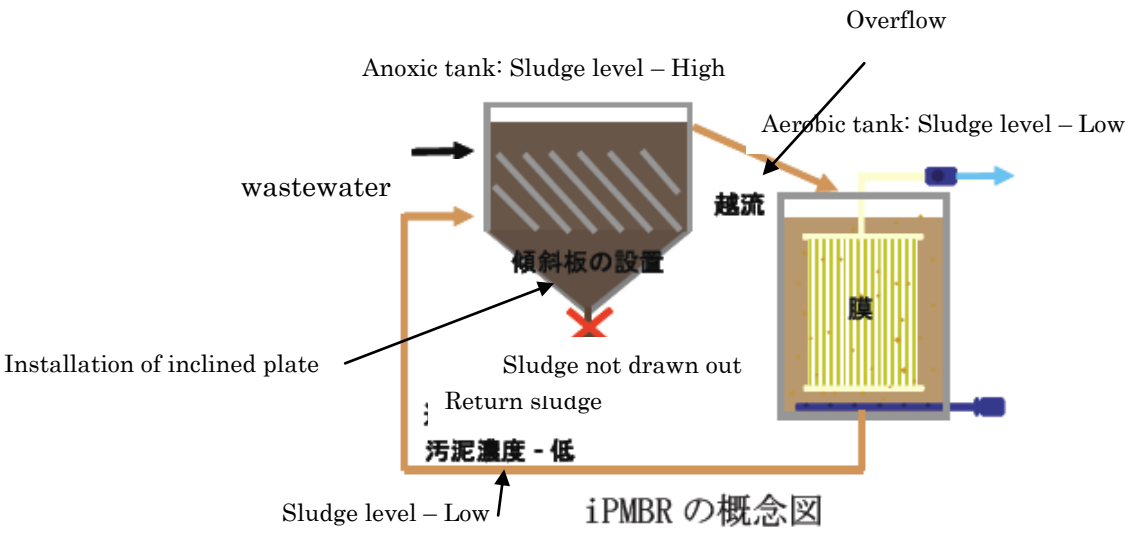
Camera system for examining large-caliber pipe (conduit)



Sensor for detecting water level

Comfort Improvements

Field	Measures so far taken	Future measures
Combined sewer overflow improvement technology	Ex-post evaluation of the vortex flow type water level control technology, etc.	Development of continuous measuring instruments for combined sewer overflow for enhanced accuracy of its monitoring, etc.
Advanced treatment technology	Development of nitrogen removing technology using the sand filtration facility, etc.	Research on membrane separation bioreactor, etc.
Ambient environmental countermeasure technology	Development of the deodorization method depending on the odor concentration (level) and place of use or of the effective deodorization method using new deodorant, etc.	Development of odor restraint technology for building pits, etc.



Membrane separation bioreactor with inclined plate

Global Warming Countermeasures

Field	Measures so far taken	Future measures
Greenhouse gas reducing technology	Establishment of high-temperature incineration method to reduce the greenhouse gas (N_2O) from sludge incinerator, etc.	Development of the technology using catalyst for reducing greenhouse gas from sludge incinerator

Energy-saving technology	Introduction of fine bubble diffuser with excellent oxygen transfer efficiency and less power consumption	Development of low-moisture dewatering technology to improve the energy efficiency of sludge carbonization and gasification facilities, etc.
Technology for utilization of renewable energy sources	Development of the technology for recovering untapped energy such as effluent head drop as electric power, etc.	Development of the technology for utilization of natural energy with no emission of greenhouse gas, such as solar light, etc.

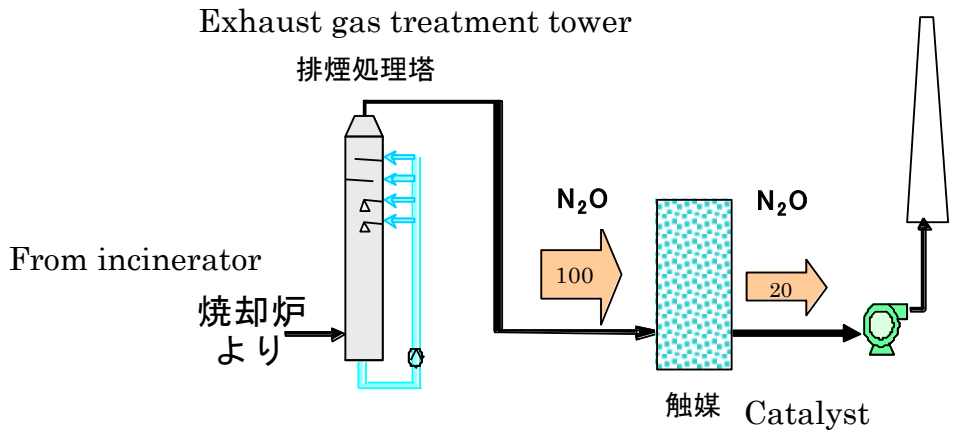
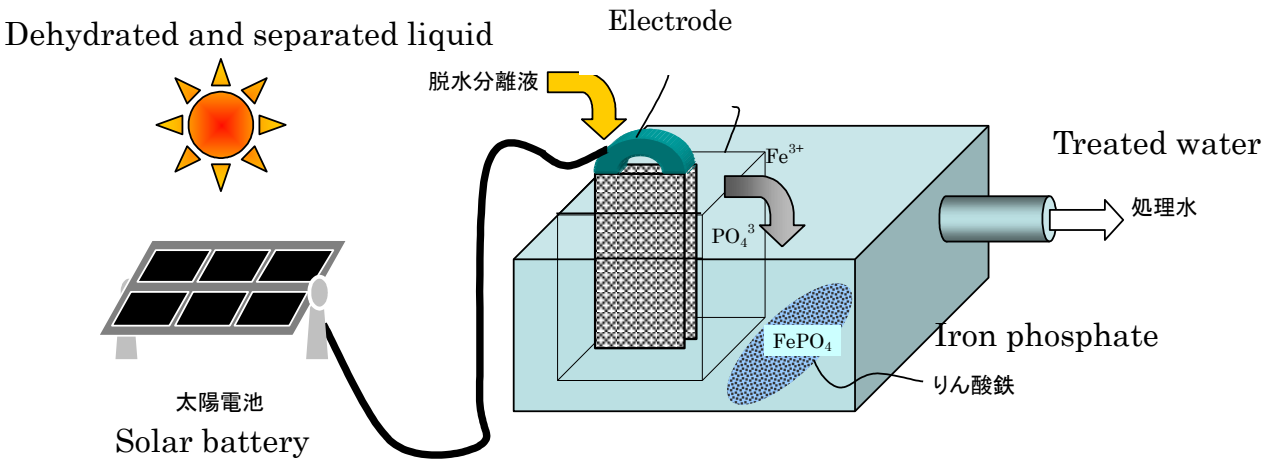


Image of N_2O reduction technology

Effective Use of Resources

Field	Measures so far taken	Future measures
Treated water recycling technology	Development of technology for improving the quality of reclaimed water, etc.	Development of distillation technology for producing hygienically safe reclaimed water, etc.
Sludge recycling technology	Development of raw material providing type recycling technology to enable the use of size-controlled ash as the raw material for concrete products, etc.	Development of technology for recovering phosphor contained in sludge or burned ash, etc.



Phosphor recovery technology using iron electrolysis

High-efficiency Business

Field	Measures so far taken	Future measures
Construction technology	Development of solidified sulfur, an acid-resistant material, etc.	Development of corrosion prevention technology for trunk line
Maintenance and management technology (pipeline facilities)	Development of technology for preventing adhesion of oils, etc. Development of technology for preventing disconnection of optical fiber cable, etc.	Development of technology for effective removal of phosphor from sludge-treated return water, etc.
Maintenance and management technology (wastewater treatment and sludge treatment facilities)	Development of technology for effective removal of phosphor from sludge-treated return water, etc.	Development of effective sludge treatment technology due to integrated sludge treatment, etc

Maintenance and Improvement of Technological Aptitude

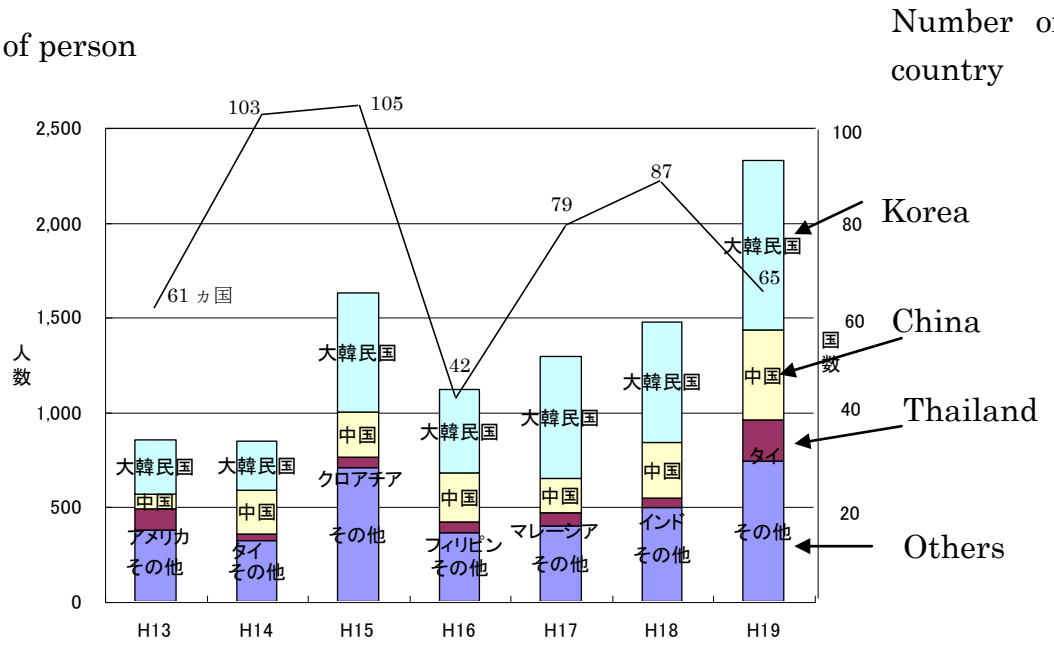
In order to promote maintenance and improvement of personnel's technological aptitude, succession of technology is important through sharing of technical data and transmitting the information inside and outside the Bureau. Besides, technological aptitude can be further improved through exchange of technology among the organizations related to sewerage and various other countries.

Succession of Technology

In order to hand down the technology (to the next generation), sharing and effective utilization of technical data (information) will be promoted, and continual disclosure of information will be conducted inside and outside the Bureau. As a part of it the existing system was modified in fiscal year 2006, and the Technical Data Search System and Technical Data Base were introduced.

Exchange of Technology

The technology exchange involves technical cooperation with the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and international exchange. This way we can obtain a wide range of up-to-date technical data and also transmit information from the Bureau, contributing to improved maintenance of technological aptitude through mutual exchange.



Transition of customers from abroad

View of “Training for Sewerage Maintenance and Management Engineers,
” one of the joint projects of “Asian Metropolitan Cities Network – 21.”