To operation of public infrastructure in the age of world unity

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Introduction

Information from around the world is transmitted instantaneously not only by TV, but over the internet, most food products and miscellaneous day-to-day goods are imported and their share is growing, Japanese corporations are beginning to procure supplies overseas and place priority on hiring foreigners, and English is becoming an official language.

On the other hand, a prolonged economic slump has been accompanied by tightening financial restraints both at the national government and local level, and in regions where the population is declining and society aging, concern regarding the maintenance and renewal of the public infrastructure which supports daily life and economic activities has become a real problem.

This report introduces trends in sewage systems as their operators search for ways to contribute internationally such as through measures to counter global warming, and to encourage domestic growth while lowering the costs of constructing, operating, and renewing their facilities in modern society, which is now in the midst of a process of international unification.

1. For cheaper and faster improvement of pipelines

The cost of providing pipelines generally accounts for 60% to 70% of the total cost of a sewerage system, which consists of pipelines and treatment plants. Through the efforts of our predecessors, the nationwide sewered population has reached 73.7% (end of FY2009), and the sewered population plus the percentage which treats sanitary sewage using septic tanks etc. has risen to 85.7% (end of FY2009), but neither service is available in districts with a total population of 18 million people. So in FY2006, the Sewage System Quick Project, a social experiment regarding technologies to lay pipelines cheaply and quickly, was kicked off. The Wastewater Control Department of the NILIM is contributing to the selection of diverse technologies such as exposed pipelines, which are placed on the ground surface instead of underground (Fig. 1), through social experiments to test such technologies, and, reporting on their findings, by providing technical support for technology evaluations, and so on.

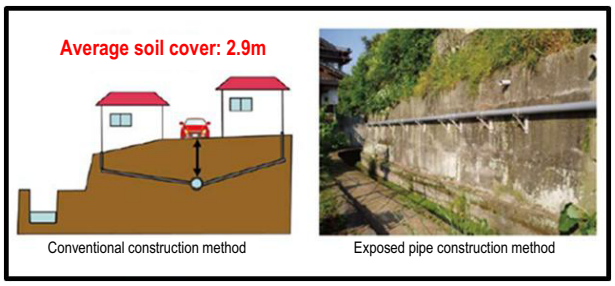

Figure 1. Exposed Pipes

2. Revolution in wastewater treatment technologies

More than half of the population of Japan discharges sanitary water into Tokyo Bay and other closed bodies of water, but the percentage of the population served by sewage systems performing advanced treatment of sewage is very low at only 16.9% (end of FY2008), and the percentage of treated sewage which is now reused stands at a mere 1.4% of all treated sewage.

The most common sewage treatment method in use is the activated sludge method which employs microorganisms, but replacing facilities to introduce more advanced facilities while continuing to operate treatment plants on narrow sites in urban districts is a daunting task. The revolutionary “membrane treatment technology”, which is not only compact, but can also easily obtain immediately reusable high water quality, is now spreading worldwide.

Japanese manufacturers supply a huge share of the world market for the membranes, but they are only used at about 10 small scale sewage plants in Japan. In order to make a big contribution to promoting the application of this method to deteriorated facility reconstruction and renewal projects in large cities and to satellite treatment in water demand regions, the Advance of Japan Ultimate Membranebioreactor technology Project (A-JUMP), a national government financed project to prepare guidelines to proving and introducing the method at large treatment plants was inaugurated in FY2009 with the cooperation of corporations and regional governments. To cut the energy used for aeration needed to prevent filter clogging and to tackle a variety of problems which arise when introducing the method at an existing plant, the NILIM is serving as a member of the project administrative office to revise existing guidelines in light of new knowledge which is being continually obtained. These efforts are counted on rapidly expanding its introduction to large-scale plants in Japan.

3. Using sewage sludge to create resources and energy and fight global warming

The next topic is sewage sludge formerly buried in landfill as industrial waste material. Through strenuous efforts of various kinds, the recycling rate of this sewage sludge has been increased to 78% (as of FY2008), but the rate of use as biomass taking advantage of its organic constituent has stopped at only 23% (as of FY2008). Treating wastewater consumes nearly 1% of all energy use in Japan, focusing national attention on this field of technologies because of the recent soaring cost of energy, project and maintenance costs, and the importance of measures to counter global warming.

The LOTUS (Lead to Outstanding Technology for Utilization of Sludge) Project, which was inaugurated in FY2004 to achieve two goals, (1) reuse is cheaper than disposal and (2) generating electricity is cheaper than buying electricity, is developing practical technologies such as technology to recover, dry, and carbonize biogas (methane) to form solid fuel briquettes by a digestion (fermentation) process. In FY2011, the project had selected and verified technology which has sharply cut the cost of construction and substantially lowered greenhouse effect gases through energy recovery, and led by the NILIM, is now preparing for the large scale guideline enactment project, B-DASH (Breakthrough by Dynamic Approach in Sewage High Technology Project).

These projects are counted on to develop sewage systems which function as urban infrastructure contributing to the environment in the areas of both resource recycling and of energy.

4. Maintaining and using existing systems

The era when infrastructure provided rapidly during the era of high speed economic growth and various other parts of our public capital must undergo full-scale renewal is near at hand. With limited finances and personnel, we are concerned with the need to decide how to make predictions and reach repair or reconstruction decisions in order to perform systematic stock management.

While facing problems such as road surfaces caving in above deteriorated water mains, the Sewage Pipeline Service Life Extension Support System was inaugurated in FY2008 as a national government subsidized project. Under this system, service lifetime extension plans enacted for sewage system projects nationwide are now in progress with their completion scheduled for FY2012. The NILIM has been collecting and analyzing nationwide data concerning pipelines, resulting in the completion in 2007 of the Basic Concepts of Stock Management in Sewage System Projects (Draft) and the preparation of the, still incomplete, Handbook of Stock Management of Sewage System Projects.

5. Aggressively responding to international standards

Table 1. Trends Related to International Standards

Name	International standard
TC224: Used for potable water supply and sewerage services	ISO24510-2
TC138: Plastic pipe for transporting fluids	ISO4435, 8773, etc.
PC253: To reuse treated waste water as irrigation water	Being prepared
TC255: Biogas	Being prepared
PC251: Asset management	Being prepared

The Water Quality Control Department took part in the first meeting of ISO/PC251 held in Melbourne from February 28 to March 4 to prepare proposed international standards for asset management including overall social infrastructure in various areas. Two working groups (WG) were established to discuss the contents at the same time as they agreed on a three-year standardization schedule. The next meeting will be held in October in Washington.

Public projects above a certain scale are already required to make procurements applying international rules under a WTO Agreement, but the international standards, ISO etc. which require compliance with domestic regulations and standards are being enacted one after another for various kinds of hard and soft public capital.

And in the public water supply and sewage system fields, the 2007 ISO/TC224 General Meeting (Tokyo), enacted international standards for drinking water and sewage services and decided to begin the task of enacting new international standards for assets and for crisis management, signaling the arrival of the age when the ISO has gained full-scale influence over domestic standards. Other related trends have begun as shown in Table 1.

With the ISO style, in which a core group formed through voluntary participation actually decides on proposals, if we do not detect trends and leap directly into discussions, we can be left in the position of having to comply with predetermined results. We advocate an aggressive response through the national government's intellectual property strategy.

Conclusions

In neighboring Asia, a population several tens as large as Japan's is continuing high speed economic growth. Private sector companies now play a major role in infrastructure projects in Japan. It is essential that while creating new procedures on one hand, we also reliably predict technologies etc. in order that public services, which must never cease to operate, continue to function at appropriate levels. We are determined to respond nimbly to high speed change around the world by appropriately determining regional needs and adopting a long-term perspective.