Aiming at Improvement in Sewerage Management

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1. Sewerage system provides ultimate service

Treatment of excrement and wastewater is very important for communities. With sewerage systems, these can be easily treated. With an urban piping network, waste matter can be transported utilizing water and gravity.

Sewerage system users are required to pay a sewerage service charge for the benefit of using the system and a fee based on the polluter-pays-principle for treatment of pollution in public waters. Sewerage service covers not only communities but also the natural outdoors and environments, such as aquatic eco-systems.

Sewage consists of wastewater and rain water, as the treatment of rain water is also essential for communities. In Japan, a tax is used to fund measures to drain rain water, but that tax and sewerage service charge are the same in that they are both paid by residents. Waste water and rain water are quite different in how quantity is measured and how they are treated, as well as in quality, so sewerage personnel must have broad knowledge about them.

Sewage contains biomass energy, resources such as nitrogen and phosphorus, and heat, which are discharged as a consequence of human activity. Technologies for recovering and utilizing these resources are progressing. Such technologies should be further developed and expanded by solving cost problems in order to contribute to the formation of a recycling society.

2. Some specific areas of sewerage management

The key to management must be comprehensive strength. Without a total balance amongst organization, planning, construction and reconstruction, operation, maintenance, and financial considerations, it is difficult to sustain the management of works in the future.

Moreover, there are some specific areas of sewerage system management. This section highlights keywords and matters of interest concerning these areas.

(i) Stock management: Safety assurances, function maintenance, reduction of life-cycle costs, cost equalization, etc.

As a special note, total length of sewage pipes laid has reached about 450,000 km, equivalent to slightly more than 11 circles around the earth, and a sharp increase in old pipes is henceforth expected. It is, therefore, an important priority to establish efficient measures in order to prevent disasters by studying past cases of road subsidence due to deteriorated sewage pipes, as well as data concerning pipeline degradation. It is also necessary to accelerate the planning of efficient measures that are affordable even to local governments with small budgets. Such measures may include the development, introduction, and evaluation of accurate, quick, and cost-efficient methods for surveying and diagnosing deterioration, as well as life extension measures such as partial restoration.

(ii) Water environment management: Water quality conservation in public waters, improvement of water use systems, rain water management, etc., required from a broad / recycling viewpoint.

It is necessary to keep a good balance between the amount of energy used for water quality improvement / water utilization and the level of water treatment. For what regards the water quality of public waters, such as bays, management has recently been required considerations for balanced ecosystems, fishery resources and other facets rather than focusing entirely on reducing nutrients. In addition, to control damage caused by inland water inundation, it is required to properly assess the capability of existing infrastructure and establish measures to mitigate inundation damage caused by localized heavy rains, etc. in cooperation with sewerage and river projects, and other organizations.

(iii) Energy resource management: Recovery of nutrients and energy from sewage, control of greenhouse gases (CO2, N2O, etc.), and recovery of urban waste heat.

The Breakthrough by Dynamic Approach in Sewage High Technology (B-DASH) Project is underway to demonstrate advanced technologies. From 2014, the projects, such as producing hydrogen from sewage sludge and developing energy-saving water treatment, have begun.

(iv) Risk management / Crisis management

As a risk related to water quality, there is the potential harm to people and ecosystems from chemicals or pathogenic microbes contained in sewage. When reutilizing sewage treatment water, it is necessary to manage water quality risks according to application, and show consideration for such standards. The spread of sewerage systems has improved the control of water-borne infectious diseases such as cholera, which had killed many people, and extreme water pollution. However, it is still necessary to evaluate and take measures against an enormous number of chemical substances and medicines in sewage. These substances are used not only by factories but also at home, and flow into the environment via sewerage systems.

It is also necessary to take preventive steps as well as responsive action for emergency cases, such as the overflow of wastewater from sewerage systems, which occurred in the Great East Japan Earthquake. It is also an urgent issue to take structural and non-structural measures assuming the occurrence of major earthquakes and tsunamis.

3. Reinforcement of financial thinking

For sewerage projects, corporate accounting has been introduced by local governments and the practice is spreading. Depreciation costs are important for industries with very large fixed assets such as a sewerage system. To depreciate costs means to account for the annual decrease in the value of newly installed fixed assets based on usage as non-cash expense in annual profit and loss statements. It is also necessary to account for revenue against costs in a given year. Depreciation costs are calculated based on the predetermined length of life of the asset, so if the asset is used in excess of the predetermined life, it will produce profits.

In some cases, however, life extension may be inappropriate for some sewerage infrastructure and it may be more appropriate to rebuild the said infrastructure at relatively short intervals in line with technological innovation. Infrastructure for resource / energy recycling is of this type. The materials should be simplified in light of the recovery of initial costs during the life of the infrastructure.

The payment of interests arising from a loan for constructing the asset is also recognized as an expense on profit and loss statements. Since interests accrue every day once the construction funds have been borrowed, efforts should be made to deliver the best possible effect as early as possible.

With such financial thinking, it is important to either ensure adequate income against expenses (maintenance + depreciation + interest expenses) or adjust expenses in response to the estimated income.

The financial situation of most local governments is bad. As depopulation and aging progress, water usage will fall and subsequently income derived from that usage is expected to decrease. Under such circumstances, it would be difficult to ensure business sustainability without addressing stock management, risk management, etc.

Accordingly, it is increasingly necessary to simplify matters by applying past experience to reduce costs and set priorities, etc. However, it should be noted that failure to ensure financial resources for proper maintenance will shorten the life of the infrastructure and cause problems.

Furthermore, measures to increase the value of existing infrastructure should be aggressively considered. Such measures might include energy generation using local biomass other than sewage.

4. Roles of NILIM

Local governments take charge of sewerage projects and their financial and technical capabilities are various, ranging from big cities to small municipalities.

The roles of our department in NILIM are as follows. (1) Raising technical capability across the country by means of analysis, evaluation, and development of advanced findings and technologies. (2) Utilization of a wide range of information, including existing maintenance results, from all over the nation. (3) Introduction and evaluation of technical developments that particularly lead to cost reductions. (4) Making such information available to local and regional governments and other stakeholders.

Therefore, we will promote the study of technical policies for sewerage systems with the aim to improve management in ways that maintain a total balance.