Empirical Study on B-DASH Project (high efficiency resource energy utilization, low-cost / energy-saving high concentration methane fermentation, sewage treatment facility management cycle) (Research period: from FY2018)

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1. Introduction

In order to promote energy saving and energy creation in sewerage, low-cost and efficient innovative technologies need to be developed. Accordingly, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has been promoting the "Breakthrough by Dynamic Approach in Sewage High Technology" (B-DASH) project since fiscal 2011 in order to realize cost reduction, creation of renewable energy, etc. in sewerage projects through acceleration of R&D and practical use of innovative technologies. In addition, National Institute for Land and Infrastructure Management (NILIM) has been studying innovative technologies as a commissioned research in the B-DASH Project. We also started to study further three technologies in fiscal 2018.

This paper introduces the outline of three studies that started in fiscal 2018 ---"Empirical study on efficient energy utilization technology by high concentration digestion / energy-saving biogas purification", "Empirical study on low-cost / energy-saved high concentration methane fermentation technology for small sewage treatment facilities," and "Empirical study on continuous stock management realization system technology based on maintenance and using cloud service."

2. Empirical study on efficient energy utilization technology by high concentration digestion / energy-saving biogas purification (Joint research organization of Kobelco Eco-Solutions Co., Ltd., Japan Sewage Works Agency, and Fuji City)

Introduction of biogas utilization technology is not proceeding in small- to medium-sized sewage treatment facilities because initial investment (construction cost) is large for introduction and their personnel and finance are insufficient.

This empirical study aims to demonstrate that improvement in operational stability and effect of cost saving are obtained through installation / operation / measurement of real-size facilities from the efficient energy recovery technology by high purity gas purification, biogas use, etc. (energy recovery technology for middle-scale treatment facilities). Specifically, real-size facilities are installed for the efficient energy recovery / utilization system from sewage sludge by combining a compact digester, low-powered biogas purifier in order to verify small hydrogen production / feeding equipment, and digestion performance, biogas purification performance, hydrogen production performance, and maintainability.

Introduction of this technology is expected to reduce total cost (construction cost per year + maintenance cost) and improve energy recovery rate by low-powered and efficient supply of high purity biogas and biogas-derived hydrogen.

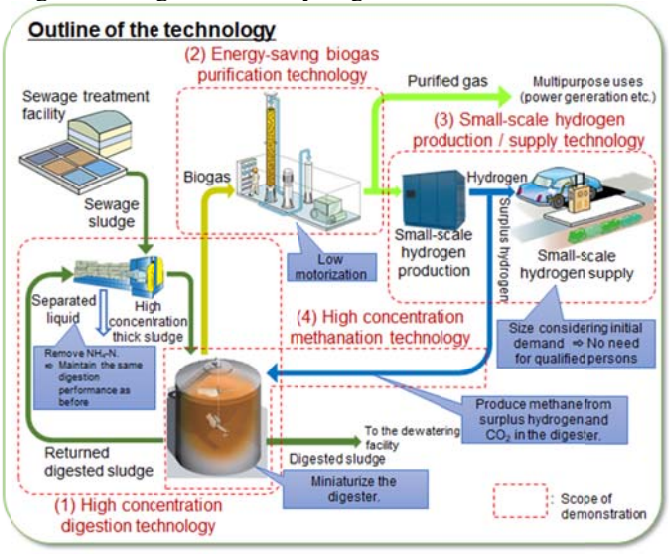

Fig-1: Outlie of the efficient energy utilization technology by high concentration digestion / energy-saving biogas purification

3. Low-cost / energy-saved high concentration methane fermentation technology for small sewage treatment facilities (Joint research organization of Ohara

Corporation, Nishihara Environment, NJS, Nagaoka University of Technology, Hokkaido University, and Nagaoka City)

Small- and medium-sized sewage treatment facilities are faced with the issue of low rate of energy recovery due to little progress in introduction of digesters, which is attributable to the lack of economy of scale, large initial investment (construction cost), etc.
This empirical study aims to demonstrate that improvement in operational stability and effect of cost saving are obtained through installation / operation / measurement of real-size facilities from the efficient energy recovery technology by high purity gas purification, biogas use, etc. (energy recovery technology for small-scale treatment facilities).
Specifically, demonstration facilities in almost real size are installed to verify digestion performance, concentration at the time of concentration operation, dewaterability at the time of dewatering operation, maintainability at the time of both operation, and performance of biogas power generation concerning the technology to reduce sludge / recover gas by conducting high concentration digestion of high concentration thick sludge, obtained from two-tier use of dehydrator as concentrator, in a unitized compact horizontal digester.
Introduction of this technology is expected to bring reduced total cost (construction cost per year + maintenance cost), stable treatment, improvement in digestion efficiency, etc.

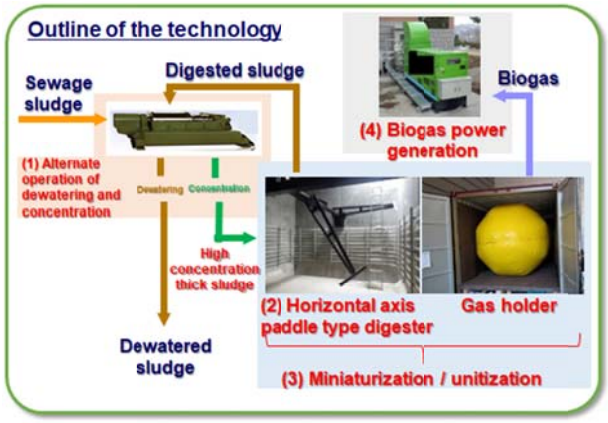

Fig-2: Outlie of the low-cost / energy-saved high concentration methane fermentation technology for small sewage treatment facilities

4. Empirical study on sustainable stock management realization system technology based on maintenance and using cloud service (Joint research organization of Metawater Co., Ltd., Ikeda City, and Ena City)

Since many sewerage systems need to be renewed in the near future, it is required to practice effective stock management. However, local governments are faced with the issue that deterioration of equipment is not reflected in the stock management plan because information concerning facility management is not integrally collected / summarized.
This empirical study demonstrates the technology for efficient sewerage system (treatment facilities / pump station) management using ICT, which contributes to efficiency increase of stock management, aiming to realize proper and sustainable management of deteriorating sewerage system.
Specifically, the study aims to verify cost leveling by optimal maintenance, possibility of wide-area / joint management of sewerage service, business profitability, and cost effectiveness by introducing a system for conducting sustainable stock management into actual sewage treatment facilities through integral control of maintenance data in cloud service and continual implementation of soundenss evaluation.
Realization of efficient stock management, etc. is expected from introduction of this technology.

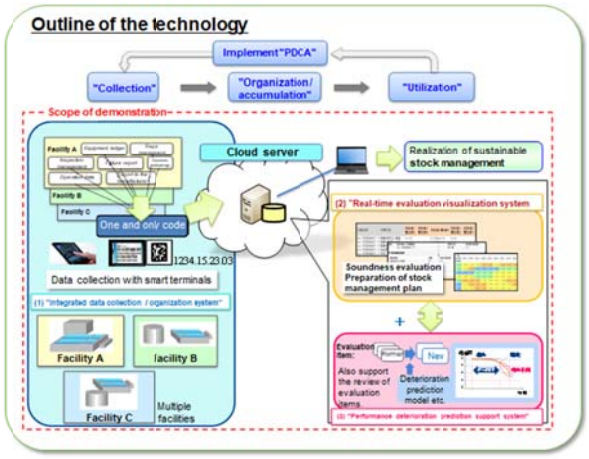

Fig-3: Outlie of the continuous stock management realization system technology based on maintenance and using cloud service

5. Future development

For the three technologies introduced herein, we intend to continue empirical study in fiscal 2019 to verify operation performance, service profitability, etc.
In addition, the NILIM continues to lead the B-DASH project and aims to contribute to cost reduction and productivity improvement in sewerage service by promoting dissemination of innovative technologies.

☞See the following for details.

[Reference] Website introducing B-DASH
http://www.nilim.go.jp/lab/ecg/bdash/bdash.htm