# Formulation of B-DASH Project Guidelines (Sludge drying technologies, Water treatment technologies [Waste sludge reduction type and water volume variation responsive type])

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## 1. Introduction

Sewerage is an essential social capital for the life of citizens, and as response to the global warming and tight supply of resources / energy, effective use of sewage resource is required. Sewage sludge is introduced in the Productivity Revolution Project as "Japan's original resource that can be used variously, such as biogas and sludge fuel, due mainly to the recent technical progress, although it had been disposed of as waste to be used for landfill, etc."

In addition, the New Sewerage Vision Acceleration Strategy (August 2017, Sewerage and Sewage Purification Department, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)) has placed importance on the promotion of development of water treatment technologies that can flexibly respond to changes in social situations including depopulation.

Development of new technologies considering such social demand and administration needs is going on but many sewerage service providers are prudent in introduction because of little performance. For this reason, the Sewerage and Sewage Purification Department, Water and Disaster Management Bureau, MLIT, launched the "Breakthrough by Dynamic Approach in Sewage High Technology" (B-DASH) project in fiscal 2011, and the Water Quality Control Department of NILIM serves as an executing agency of this empirical project. The purpose of this project is to demonstrate excellent and innovative technologies, formulate guidelines for introducing them, and disseminate them in order to realize cost reduction in sewerage service, creation of renewable energy, etc.

## 3. Outline of the guidelines

Guidelines were formulated for each technology based on the results of the empirical study and opinions of local governments and evaluated by experts. The proposed structure of guidelines is as follows (Table 1). The following sections introduce part of the contents of guidelines, including outline of demonstrated technology.

Table 1. Structure of proposed guidelines

| | |
|---|---|
| Chapter 1. General Provisions | Objective, scope of application, definitions of terms |
| Chapter 2. Outline of the Technology | Characteristics of the technology, terms of application, evaluation results |
| Chapter 3. Consideration of Introduction | Method of considering introduction, examples for consideration of introduction effect |
| Chapter 4. Planning and Design | Introduction planning, design |
| Chapter 5. Management | Inspection items, frequency, etc. |
| Data | Demonstration results, case studies, etc. |

## 3. Outline of demonstrated technology, etc.

(1) Highly efficient sewage sludge drying technology with self-heat recuperative heat pump

A sludge drying technology for collecting / using the vapor latent heat in the sludge drying exhaust gas by incorporating the dryer into the heat pump cycle for integration. With this technology, it is possible to dry sludge with reduced energy and use the dried sludge generated as fertilizer or fuel. This technology is expected to be introduced into small and-medium-sized treatment facilities etc. considering renewal of dryers and promote the effective use of sewage resources (Fig. 1).

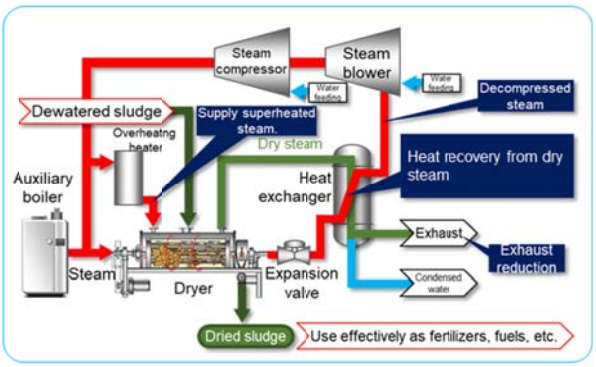


Fig. 1. Outline of the technology

(2) Technology to convert sewage sludge to fertilizers / fuels with the dewatering drying system
This technology is a combination of the inside double coagulation type centrifugal dehydrator, which discharges low-adhesion granular dewatered sludge, and the annular flash dyer, which adjusts moisture content of dried sludge by adjusting hot blast temperature. In addition to the drying of sludge with reduced energy, this technology enables the use of dried sludge generated as fertilizer, fuel, etc. according to demand season etc. by adjusting moisture content widely (10-50%). This technology is expected to be introduced into small and-medium-sized treatment facilities etc. considering renewal of dehydrators and dryer and to promote the effective use of sewage resources (Fig. 2).

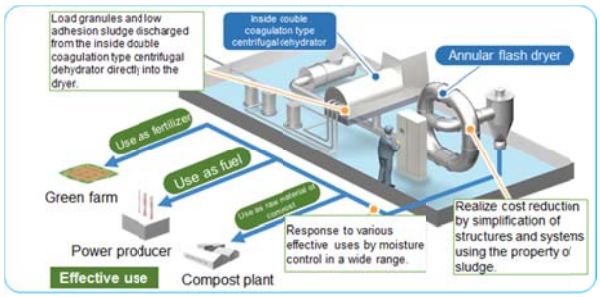


Fig. 2. Outline of the technology

(3) Water treatment technology with excess sludge reduction using special fiber carrier
This is a water treatment technology to conduct aerobic treatment by installing a multistage type special fiber carrier unit in the treatment tank to hold microorganisms in the unit. Adoption of multistage treatment causes habitat segregation of microorganisms from upstream to downstream of the reaction tank, i.e. "bacteria → protozoa → metazoa," as well as food chain, and thereby controls the generation of excess sludge. This technology can be used for reaction tanks with existing oxidation ditch process and is expected to be introduced into small to medium-sized municipalities where the process above is applicable and to reduce total treatment cost as a result of reduced sludge treatment cost.

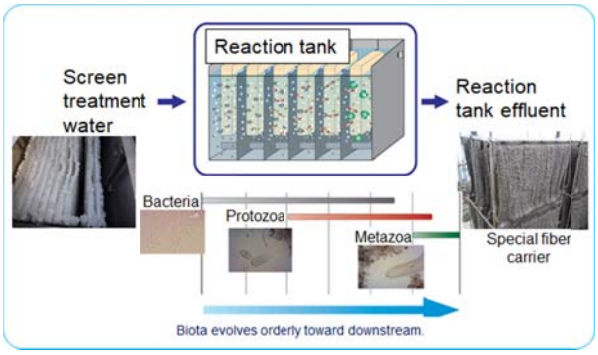


Fig. 3. Outline of the technology

(4) Water treatment technology responsive to water volume variation using DHS system
This water treatment technology consists of "primary settling tank", " filter bed filled up with spongy carrier (DHS filter bed)", and "biofilm filtration facility." With this technology, it is possible to reduce the number of units on DHS filter bed and the amount of filling carriers in accordance with decrease in influent quantity, which leads to reduction of construction cost at the time of water treatment facility renewal and maintenance cost. It is also possible to use existing reaction tanks with conventional activated sludge process for cost reduction. The technology is expected to be introduced into small to medium-sized municipalities where influent quantity is expected to decrease as a water treatment technology responsive to changes social situations including depopulation (Fig. 4).

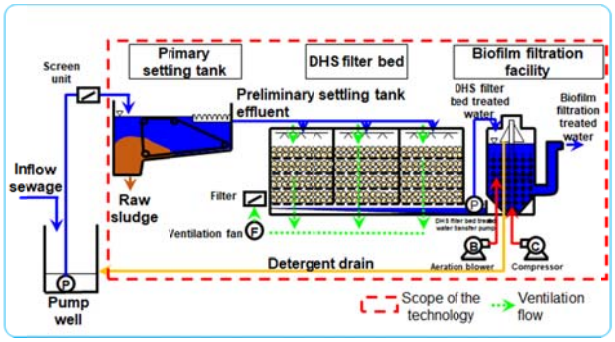


Fig. 4. Outline of the technology

## 4. ilization of findings and future development

NILIM formulated guidelines based on results of empirical studies and held the guideline presentation meeting in the Kitakyushu International Conference Center in July 2018 to introduce them to local governments, sewerage related companies, etc., attended by more than 60 persons.
We intend to introduce the guidelines actively through presentation meeting etc. and continue to strive for dissemination of innovative technologies.

Photo: Guidelines Presentation Meeting

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☞**See the following for details.**
[Reference] Guidelines posted:
http://www.nilim.go.jp/lab/ecg/bdash/bdash.htm