

# Support Survey on the Development of Guidelines for the Implementation of Innovative Technology (Sludge-to-Fuel Technology) for Sewage Works

Year of Research

2013

Establishment of energy and resource recycling

## (Purpose)

The Ministry of Land, Infrastructure, Transport and Tourism is conducting the Breakthrough by Dynamic Approach in Sewage High Technology Project (B-DASH Project) in order to accelerate research and development and implementation of new technologies, thereby realizing sharp reductions of the LCC, greenhouse gas emissions and energy consumption in sewage works. The purpose of this study was to collect the information required for the development of the guidelines to implement the innovative technology (sludge-to-fuel technology) for sewage works and to create basic data for the verification tests that have been conducted since 2012.

## (Results)

(1) Collection and organization of information necessary for developing the guidelines

As the information necessary to develop the guidelines, we organized general information including an overview and operation and maintenance for existing technology as compared with the innovative technology for sewage works. The target (existing) sludge carbonization/sludge-to-fuel technologies are: i) low-temperature carbonization, ii) medium-temperature carbonization, iii) high-temperature carbonization. The sludge drying/sludge-to-fuel technologies studied are: i) granulation and drying (direct drying system), ii) drying and granulation (indirect drying system), iii) modification and drying, and iv) drying in hot oil under a vacuum. The following information was mainly collected to evaluate the specific difference. We summarized: [1] the difference in fuel production process, [2] the fuel value of the fuel product, [3] the safety of fuel product, [4] utility, [5] an environmental assessment, [6] a cost assessment.

(2) Case studies on the benefits achieved by the implementation of sludge-to-fuel technology in corroborative research

We provided the concept, scale, and target range of case studies for reviewing the implementation of sludge-to-fuel technology in corroborative research. For the standard sludge properties that are used for case studies (**Table 1**), we suggest using the average values from the treatment plants where the average daily flow is 30,000 m<sup>3</sup>/day or more and only high polymer coagulant is used, as reported in the 2011 sewage statistics. We also suggested the relationship between the incinerator size and auxiliary fuel usage due to the difference in sludge types and the concept of the combustion load. Heavy oil usage unit per wet sludge tends to increase as incinerator size becomes smaller. Since the organic content of the undigested raw sludge is high, the ratio of necessary auxiliary fuel tends to be less compared to the digested sludge.

(3) Creation of basic data for developing the guidelines

In order to collectively evaluate each study of the conventional technologies that are subjective to the calculation and evaluation of the benefits achieved through the corroborative research, we collected and organized the latest information on the sludge properties, basic energy units, utility unit prices, and greenhouse gas emission factors, etc. We also held four review sessions according to the progress, and organized advice received from experts.

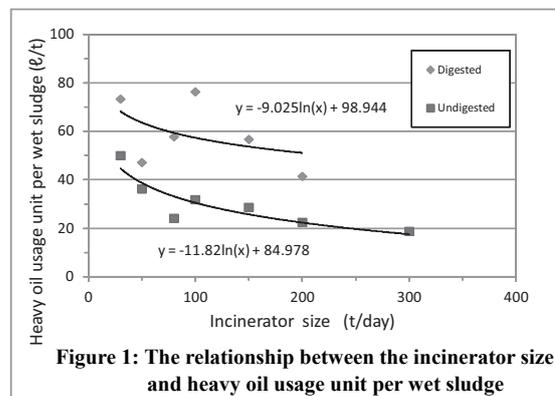
## (Summary)

Promoting the implementation and spread of innovative technologies can encourage the effective use of sewage resources and energy, which may further contribute to establishing a low-carbon and recycling-oriented society.

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**Table 1: Sludge properties for the evaluation targets**

Target sludge	Moisture content	Organic component	Remarks
Mixed raw sludge	76%	84%	Simple average for the treatment plant with an average daily flow of 30,000 m <sup>3</sup> /day and using high polymer coagulants
Digested sludge	80%	70%	



**Figure 1: The relationship between the incinerator size and heavy oil usage unit per wet sludge**

Key words

Research on Breakthrough by Dynamic Approach in Sewage High Technology, sludge-to-fuel technology, cost reduction, greenhouse gas emission reduction