Support Survey on the Promotion Policy to Spread the Innovative Technologies 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 a reduction of costs and creation of renewable energy accompanied by support for the overseas expansion of water businesses.

The purpose of this research is to study the benefits of implementation and spread of two systems that are demonstrated and evaluated in the Breakthrough by Dynamic Approach in Sewage High Technology Project for 2011, and also to create basic data to promote the systems in the sewage treatment plants in Japan and other countries.

(Results)

(1) Outline of the technologies

The following systems were reviewed.

System 1: An energy management system which applies a super high efficiency solid-liquid separation technology

Main technologies: Super high-rate solids-liquid separation technology, high-rate high-temperature digestion technology, smart power generation technology

System 2: An efficient renewable energy production system which uses biogas

Main technologies: steel plate digestion tank, new type biogas purification system, and high-efficiency heat pumps

(2) Contents of the survey

The target treatment plants are selected based on the questionnaire and municipality hearing survey in order that a wide range of cases for the target technologies can be studied. The implementation scenarios are shown in **Table 1**. The implementation scenarios are classified into the update and new construction of a digester tank, taking account of the current issues. In addition, Vietnam was selected as a possible site for implementation of the international project because there are many activated sludge processes in the country, and the country receives the most economic assistance in East Asia. Furthermore, their economic interactions are also active.

Table 1: Implementation scenario and theme

Classification	Implementation scenario, theme	Number of treatment plants
Update of the existing digester tank	Using the digestion gas for multi-purpose applications and verifying the effectiveness of each application	1
	Receiving other biomass sources and increasing the amount of energy created	1
	Implementing a new technology for the renovation update of the whole treatment facility and seeking to minimize the space	1
New construction of a digester tank	Implementing a new digester tank and seeking to use the energy from the digested gas to reduce operation and maintenance	1
	Increased amount of raw sludge by the implementation of solid-liquid separation	4
	Receiving other biomass sources and increasing the amount of energy created	2
Overseas	Refining the digested gas and studying the possibilities of using the refined gas as an automotive fuel	1

The construction costs and operation and maintenance costs associated with the implementation of the target technology are calculated for each selected implement scenario. By comparing them with those of conventional technologies, we evaluated the economic effect and calculated the effectiveness of saving and creating energies achieved by the implementation of the system. Then we confirmed the following:

- In System 1, the amount of energy recovered is increased and the amount of electricity consumption of the blower is decreased due to the implementation of the super high-rate solids-liquid separation technology. In addition, the implementation of high-rate high-temperature digestion technology allows the implementation of the digestion process at even a small site.
- In System 2, by constructing a steel plate digestion tank, biogas purification system, gas utilization facility, etc., we could obtain economical benefits through the injection of biogas into a utility pipeline, for use as automotive fuel, and in electricity generation from the gas.
- It is expected that the implementation of the innovative technology can create renewable energy and reduce the greenhouse gas emissions.

(Summary)

We evaluated the application of two systems that were demonstrated and evaluated in the Breakthrough by Dynamic Approach in Sewage High Technology Project for 2011 in a sewage treatment plant, and confirmed their effectiveness in the reduction of operation costs and the creation of renewable energy. We can expect that the spread of innovative technology will help to promote efficient sewage projects and create renewable energy when updating existing digester tanks and constructing new digester tanks in the future.

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Key words	Research on Breakthrough by Dynamic Approach in Sewage High Technology, energy technology, biomass, cost reduction, greenhouse effect gas reduction