

# A Study on B-DASH Project (hydrogen production without digestive, sewage sludge intra-regional circulation system, energy-saving advanced sewage treatment, volume reduction of excess sludge)

(Study period: from FY2016)

YAMASHITA Hiromasa, Head    OTA Taichi, Senior Researcher    YAMOTO Takatoshi, Researcher  
MICHINAKA Atsuko, Researcher (Dr. Env.)    ISHIKAWA Takeshi, Researcher  
MATSUHASHI Manabu, Researcher    WATANABE Kosuke, Guest Research Engineer  
Wastewater and Sludge Management Division, Water Quality Control Department

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## 1. Introduction

Sewerage is social capital essential to public life and measures for reducing greenhouse gases are also sought as response to the issue of global warming. In addition, there is increasing expectation for effective use of sewage resources as sewage sludge was introduced in the Productivity Revolution Project as "Japan's original resource that can be used variously, such as biogas and sludge fuel.

For this reason, the Sewerage and Waste Water Management Department of 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 objective of B-DASH is to realize cost reduction in sewerage projects, creation of renewable energy, etc. through the verification and dissemination of excellent innovative technologies and to support the overseas development of the water business by Japanese enterprises.

B-DASH Project has been implementing real-scale demonstration for technical verification by building real-size facilities and FS (feasibility) survey (, which had been called "Preliminary survey" until fiscal 2016,) as a preliminary stage of the real-scale demonstration in order to consider the possibility of dissemination including an introductory effect and verify technical performance.

This paper introduces the outlines of "Hydrogen production technology without digestive", adopted for FS survey in fiscal 2016, and "Technology for sewage sludge intra-regional circulation system," "Energy-saving advanced sewage treatment technology," and "Technology for excess sludge volume reduction," which were all adopted for FS survey in fiscal 2017.

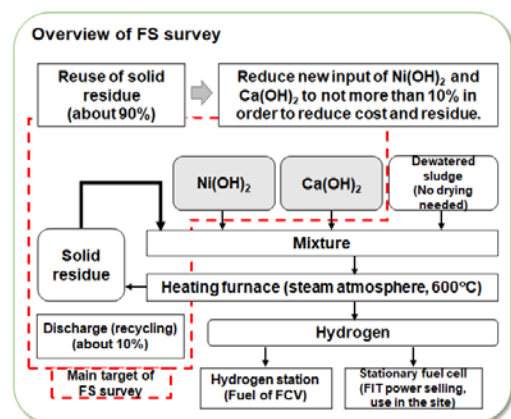
## 2. Outline of FS survey adopted in fiscal 2016

### (1) Hydrogen production technology without digestive

(i) Outline of the study on the technology of producing hydrogen directly from sewage sludge (Joint Research Organization of Tohoku University,

### Carbon Freenet Work, Yamato Sanko Mfg. Co., Ltd., and Hirosaki-shi)

Improvement of hydrogen production, reduction of life cycle cost, etc. are under verification for the technology of producing hydrogen successively from sewage sludge using nickel hydroxide and calcium hydroxide.



**Figure 1: Flow of the hydrogen production technology using nickel hydroxide and calcium hydroxide**

(ii) Outline of the study on the hydrogen production system technology using the salinity difference between sewage treatment water and sea water (Joint Research Organization of Yamaguchi University, Seiko Electric Co., Ltd., Japan Sewage Works Agency)

Improvement of hydrogen production and purity, reduction of life cycle cost, etc. are under verification for the new hydrogen production technology using the salinity difference between sewage treatment water and sea water, site conditions of sewage treatment facilities, and potential of sewage treatment water.

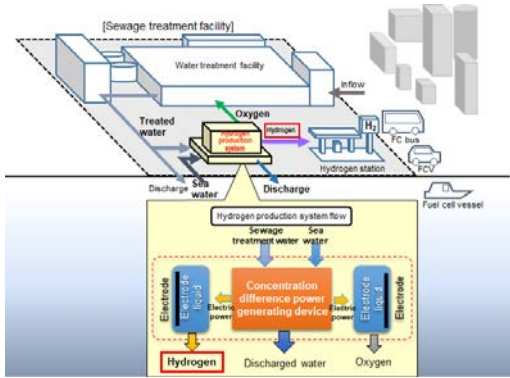


Figure 2: Flow of the hydrogen production technology using salinity difference

### 3. Outline of FS survey adopted in fiscal 2017 (1) Technology for sewage sludge intra-regional circulation system

Outline of the research and study on the intra-regional circulation system centering on straw, high concentration mixture and thermophilic digestion of sewage sludge, and carbonization (Joint Research Organization of Kanazawa University, Tottori University of Environmental Studies, Meiwa Industries, Ltd., and BIOGASLABO Co., Ltd.)

Business profitability and technical performance are under verification for the intra-regional circulation system technology centering on high-concentration thermophilic digestion by mixing straw in dewatered sludge and production of carbonized sludge fertilizer.

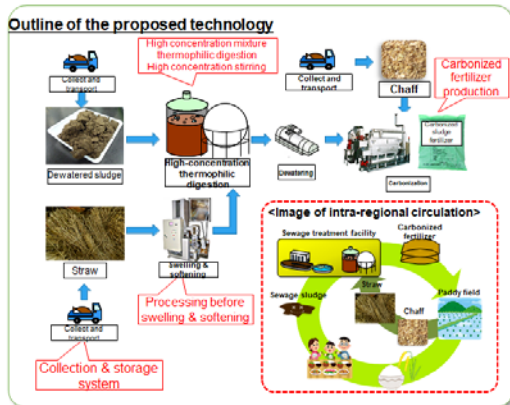


Figure 3: Flow of the intra-regional circulation system technology

### (2) Energy-saving advanced sewage treatment technology

Outline of the research and study on the energy-saving advanced sewage treatment technology using anammox bacteria (Joint Research Organization of Meidinesha Corp. and Kobe City)

In order to realize advanced treatment with energy used in the standard method, business profitability and technical performance are under verification for the technology for reducing energy usage by removing nitrogen efficiently by treatment using anammox

bacteria to reduce energy consumption and recovering energy from organic matter contained in sewage sludge more efficiently.

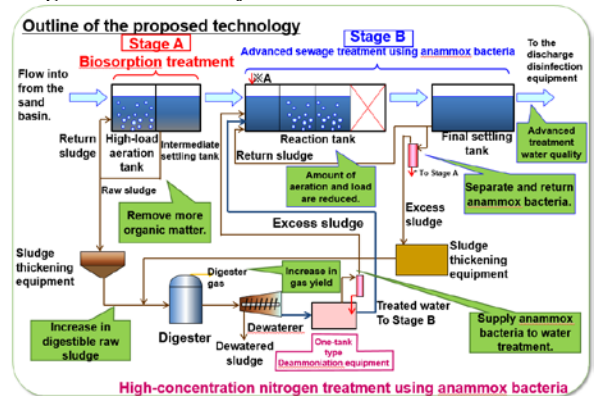


Figure 4: Flow of the energy-saving advanced sewage treatment technology

### (3) Technology for excess sludge volume reduction Outline of the study on the volume reduction technology for excess sludge in the advanced treatment by introducing high-pressure jet equipment (Joint Research Organization of Tokyo University of Agriculture and Technology, Ishigaki Company, Ltd., and Public Works Research Institute)

The effect of reducing the production of excess sludge and oxyecioia supply is under verification and business profitability is under evaluation by introducing high-pressure jet equipment that reduces excess sludge at low cost and high speed into the flocculant addition / nitrified liquid circulation activated sludge system

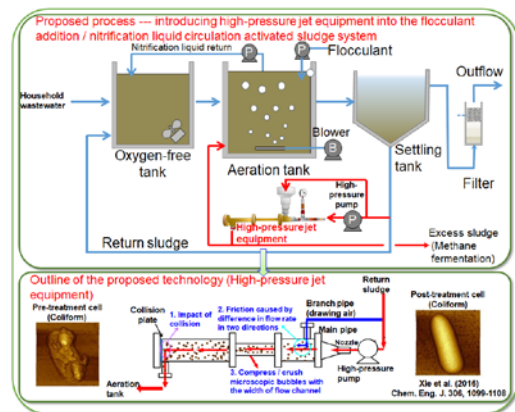


Figure 5: Flow of the excess sludge volume reduction technology

### 4. Future development

NILIM is going to continue to lead the FS survey and identify the possibility of dissemination and technical performance including the possibility of theme setting as real-scale verification technology.

See the following for details.

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