A Study on B-DASH Project (gas collection, sludge dewatering / drying, water treatment for downsizing)

(Study period: from FY2015)

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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. There are also high needs for technologies that can be introduced to small-to-medium sized treatment facilities and technologies for downsizing treatment facilities according to depopulation.

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.

This paper introduces the outlines of "Technology for efficient collection / utilization of biogas from multiple sewage treatment facilities," adopted in fiscal 2015 as real scale demonstration, and "Technology for effective use of sewage sludge for small-and-medium-sized treatment facilities" and "Water treatment technology that enables downsizing," both adopted in 2016 as real scale demonstration.

2. Outline of the real-scale demonstration technologies adopted in fiscal 2015

(1) Technology for efficient collection / utilization of biogas from multiple sewage treatment facilities

Empirical study on the technology on practical collection using a methane refiner and an occlusion container (Joint Research Organization of JNC Engineering Co., Ltd., Adsorption Technology Industries Ltd., Kyudenko Corp., Sinko Co., Ltd., Yamaga City Gas Co., Ltd., Prefectural University of Kumamoto, Otsu Town, Mashiki Town and Yamaga City)

This study aims to demonstrate the effects of promotion of effective use of sewage resources, energy production at low cost, etc. from power generation using surplus biogas in small-scale sewage treatment facilities at three locations, which are refined and kept in occlusion containers and conveyed by vehicle to one location. This study continued through the Kumamoto Earthquake and the recovery of treatment facilities from the earthquake disaster.

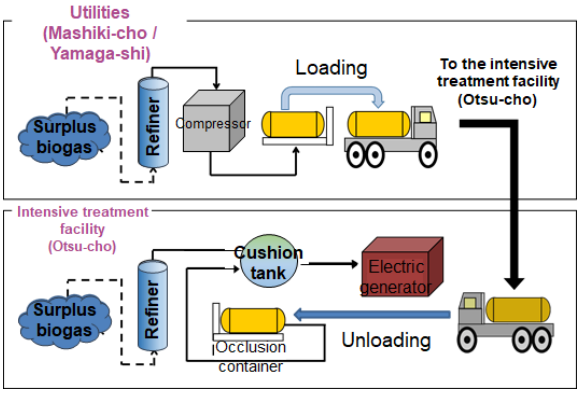

Figure 1: Flow of the technology for efficient collection / utilization of biogas from multiple sewage treatment facilities

3. Outline of the real-scale demonstration technologies adopted in fiscal 2016

(1) Technologies for effective use of sewage sludge for small-and-medium-sized treatment facilities

(i) Outline of empirical study on the highly efficient sewage sludge drying technology with self-heat recuperative heat pump (Joint Research Organization of Okawara Mfg. Co., Ltd., Hadano City and Kansai Electric Power Co., Inc.)

This study is demonstrating the reduction of the amount of sludge treatment, diversification of effective use including use as fertilizers/fuels (plant damage test, grasp of fuel needs, etc.), reduction of running cost, etc. with the aim to save energy and cost in sludge drying by recovering and utilizing thevapor latent heat in the sludge drying exhaust gas.

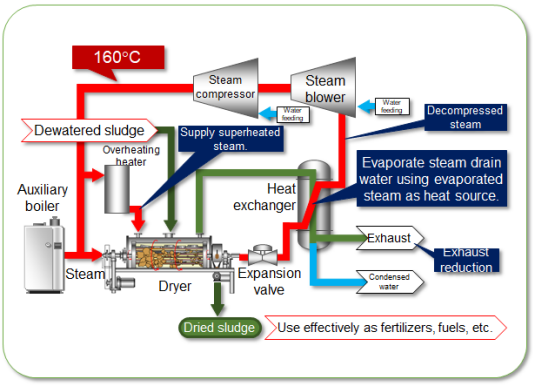

Figure 2: Flow of the highly efficient sewage sludge drying technology with self-heat recuperative heat pump

(ii) Outline of the empirical study on the technology to convert sewage sludge to fertilizers / fuels with the dewatering drying system (Joint Research Organization of Tsukishima Kikai Co., Ltd., Sun Eco Thermal Co., Ltd., Japan Sewage Works Agency, a Kanuma City, and Kanuma Agriculture Public Corporation)

This study is demonstrating adaptability to various effective uses including fertilizers and fuels by manufacturing dried sludge using the dewatering drying system (internal two-liquid thermal refining spin dryer + annular flash dryer) (fertilizer response test in a soybean field, fuel quality, etc.), as well as performance of equipment, life cycle cost reduction, etc.

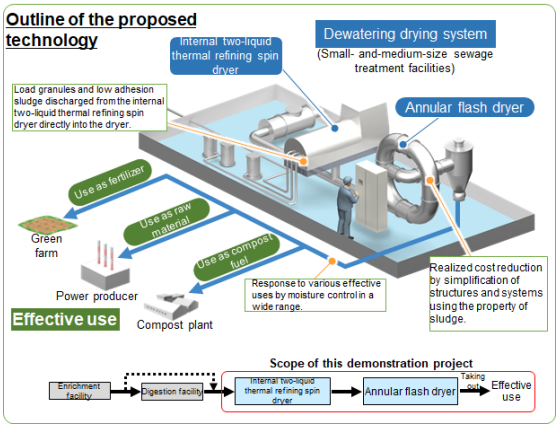

Figure 3: Flow of the technology to convert sewage sludge to fertilizers / fuels with the dewatering drying system

(2) Water treatment technology that enables downsizing

(i) Outline of the empirical study on the water treatment technology with excess sludge reduction using special fiber carrier (Joint Research Organization of IHI Environmental Engineering, Teijin Frontier Co., Ltd., Japan Sewage Works Agency, and Tatsuno-machi)

This study is demonstrating the low water temperature period, effect of sludge reduction, effect of life cycle cost reduction, etc. for the water treatment technology that enables the downsizing of sludge treatment equipment by reducing the generation of waste sludge substantially using the the multi-stage reaction tank and special fiber carrier.

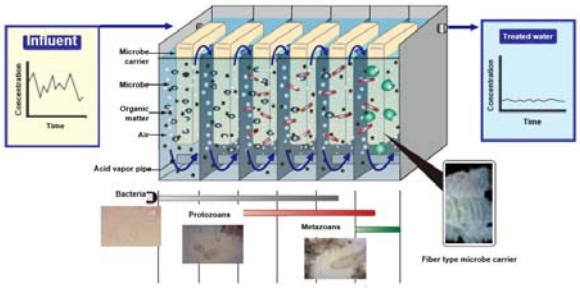

Figure 4: Flow of the water treatment technology with excess sludge reduction using special fiber carrier

(ii) Outline of the empirical study on the water treatment technology with following water amount variation using DHS system (Joint Research Organization of Sanki Engineering Co., Ltd., Tohoku University, National Institution of Technology - Kagawa College, National College of Technology - Kochi College, Japan Sewage Works Agency, and Susaki City)

This study is demonstrating the effect of reducing life cycle cost, nature of treatment cost that follows decrease in the amount of influent, ease of maintenance, and stability of processing performance for the technology that enables downsizing efficiently by combining "filter bed filled with spongy carrier (DHS filter bed)" and "biological membrane filtering tank" in order to adapt to depopulating society.

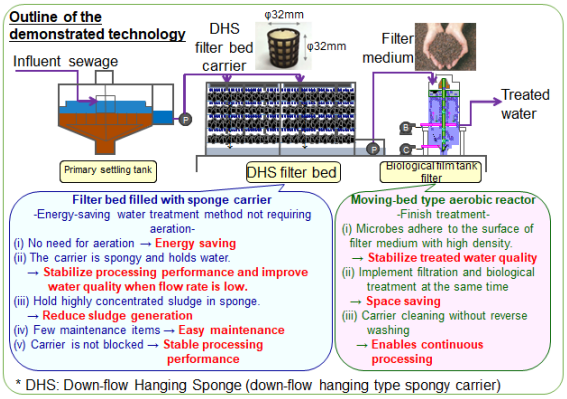

Figure 5: Flow of the water treatment technology with following water amount variation using DHS system

4. Future development

NILIM is going to continue the real-scale empirical studies and formulate successively guidelines for considering introduction based on study results and promote dissemination.

☞See the following for details.

[Reference] Website introducing B-DASH

http://www.nilim.go.jp/lab/ecg/bdash/bdash.htm