Expansion of Anaerobic Digestion and Biogas Utilization

(Research of FY 2017-2021)

1. Purpose

People are paying attention to biogas utilization from anaerobically digested sewage sludge to cope with global warming and establish a recycling society. The Ministry of Land, Infrastructure, Transportation, and Tourism has advocated using wastewater treatment facilities as platforms of integration, independence, and supply of water, resources, and energy.

This study aims to study the anaerobic digestion features of sewage sludge and local biomass, consider the acceptance procedure of local biomass and its effects, and expand the utilization of anaerobically digested sludge and biogas.

2. Outcomes of the Past Years

FY2018: Studied the anaerobic digestion characteristics of sewage sludge and local biomass and simulated the effect of biomass acceptance on wastewater treatment processes

FY 2019: Investigated trouble cases targeting wastewater treatment facilities accepting human excreta and Johkasou (household wastewater-treatment tank) sludge

FY2020: Investigated the operation status after applying prefabricated steel board digestion tanks

3. Outcomes of This Year

Previous years' studies showed that investigating the effects of local biomass acceptance with simulators requires minute calibration. Figure 1

shows estimation examples using the developed study tool. In the figure, a virtual wastewater treatment facility with a capacity of 35,000m3/day is assumed to have two cases; One is newly introducing anaerobic digestion facilities, and the other is accepting 15m3 each of kitchen waste, human waste, and Johkasou sludge per day. We can quickly see some amounts, including digestion gas generation, dewatered sludge volume, and return water load.

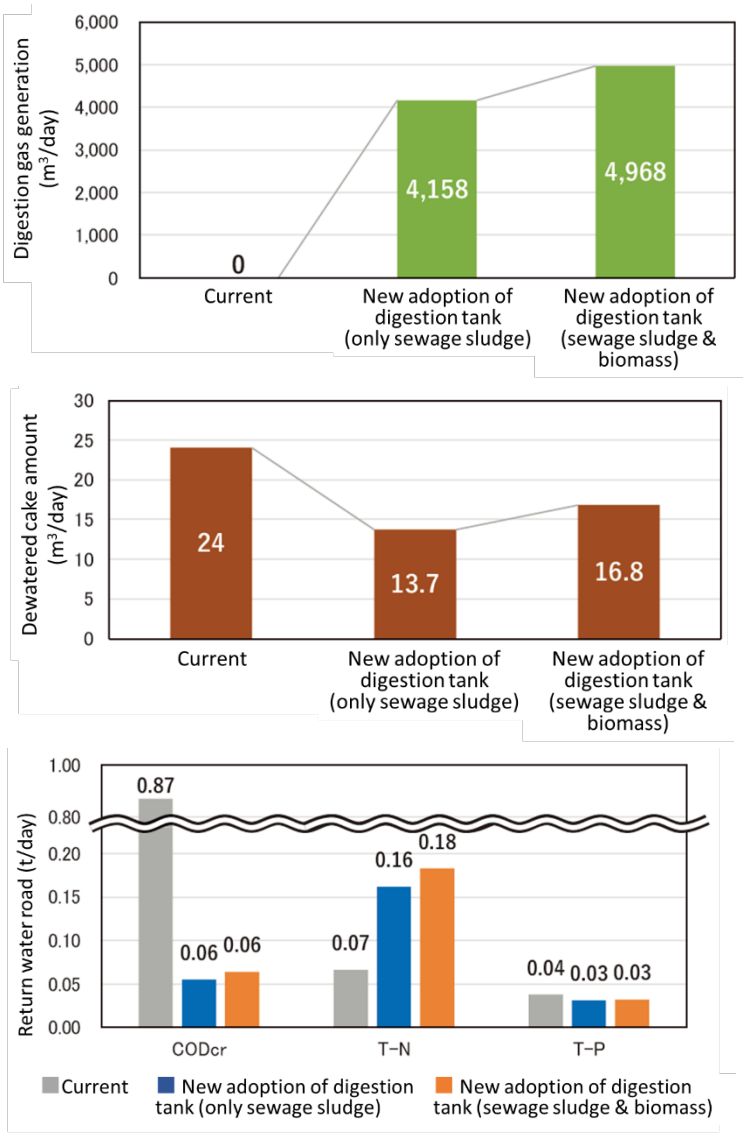

Figure 1: Trial calculation by review tool

4. Summary of The Whole Study Period

In the five-year study, we compared anaerobic digestion properties, such as gas generation, between sewage sludge and local biomass and verified which biomass could generate more digestion gas.

- Because biomass acceptance may affect wastewater or sludge treatment operations, facility design and O&M must be noted.

- The study verified that prefabricated steel board digestion tanks, which were recently popular in the introduction, had equivalent performance to conventional concrete digestion tanks and could reduce power consumption during mixing and construction periods.
- The consideration tool developed in the study could quickly predict the changes when introducing anaerobic digestion facilities or accepting local biomass.
- The simulator enables more minute consideration.

Keywords: **Anaerobic digestion, Biogas, Local biomass, Simulator**