

Expansion of Resource Utilization from Sewage Sludge by Turning to Fuel or Fertilizer

(Research of FY 2017-2021)

1. Purpose

Sewerage law amended in May 2015 defines that sewerage administrators should try to reuse generated sludge as fuel or fertilizer.

In its Productivity Revolution Project "Sewerage Innovation," Ministry of Land, Infrastructure, Transportation, and Tourism (MLIT) sets a goal to increase the reuse rates of sewage sludge for energy and agriculture from 26% in 2015 to 40% in 2020.

Based on such background, this study aims to encourage resource utilization from sewage sludge as fuel or fertilizer.

2. Achievement of This Year

This year, the following operations were carried out.

1. Investigation on the project scheme and the operation conditions of facilities related to solid fuelization technology including carbonization and drying
2. Feasibility study on the utilization of local biomass to improve the fuel efficiency of carbonization facilities
3. Physical property investigation on mixed carbide of sewage sludge and local biomass

1. As of March 2017, there are thirty examples of adoption of sewage sludge fuelization technology in Japan. JS interviewed twenty-one out of that except for scheduled operations or research projects. The questionnaires were about types of contracts, bidder selection process, a period of operation management, etc.

As a result of surveys, fifteen arrangements employ DBO (Design-build operate) which is the most, and five contracts are PFI method requiring a little-complicated procedure. Most cases apply comprehension evaluation as a bidder selection process. Most of them make operation management period twenty years. Some cases expecting technology innovation make it fifteen years.

2. Combining low water contented local biomass with sewage sludge may reduce fuel consumption at carbonization facilities. Some local biomass including rice hull, wood chip, waste paper, and bamboo can be candidates because of their low water content rates and nationwide availabilities. Among these candidates, relatively less utilized rice hull is the likeliest material while there are some regional differences because most of the wood chips and waste papers have already been reused today, and bamboo requires a high cost for fragmentation for reuse.

On the other hand, the utilization of local biomass at carbonization facilities has some issues on the matter of procurement, transportation, and storage. The result of the above hearing survey varied widely about them. Some facilities pay for supply and shipping, others at no charge. Besides, the ways of procurement and transportation affect the needs and the scales of storage facilities. The utilization of local biomass at carbonization facilities requires the establishment of the scheme that can solve these problems.

3. Figure 1 is an extract of the result of physical property investigation. It explains how the mixture of local biomass affects the surface area to volume ratio of carbide. The larger surface area to volume ratio can improve the moisture retaining property and air permeability. Figure 1 describes the mixture of rice hull and wood chip increases surface area to volume ratio of carbide more than using sewage sludge only. Besides, as carbonization temperature is getting higher, surface area to volume ratio of carbide tends to increase.

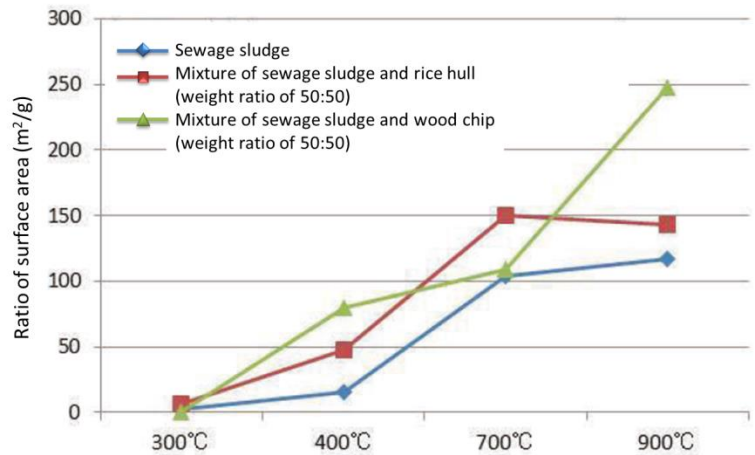


Figure 1: Ratio of carbide surface area

3. Plans

JS will continue research and investigation on technologies of fuelization and converting sewage sludge into fertilizer. The study deals with conventional technologies and basic research and contributes to the development of the technology utilizing sewage sludge as a resource.

Keywords: Fuelization, Converting sewage sludge into fertilizer, Utilization of sewage sludge as resource