

Field Test on Sewage Sludge Gasification at Sewage Treatment Plant in Kagoshima ～ Power Consumption Reduction and Environmental Sustainability in Sewage Treatment ～

Hitachi Zosen Corporation and the AIST Group (National Institute of Advanced Industrial Science and Technology, hereafter “AIST”, and AIST Solutions Co.) have decided to conduct field tests on sewage sludge gasification technology, which is currently under joint research, at the Southern Sewage Treatment Plant in Kagoshima City.

Nationwide, a large amount of electricity is consumed by aeration equipment and other equipment*¹ in the water treatment process in sewage treatment plant. On the other hand, sewage treatment plants generate approximately 2.3 million tons (on a dry basis) of sewage sludge, but only about 26% of it is used as energy. The use of digester gas generated in the ‘digestion’ process, in which sludge is decomposed by micro-organisms, is widespread, but the treatment of digested sludge*² remains a challenge.

Since March 2020, Hitachi Zosen and AIST have been conducting research on the hydrogen production process from sewage sludge with the aim of constructing a new type and gasification reforming system that directly gasifies sewage sludge without digestion and converts it into fuel gas treatment hydrogen and other components.

Until now, energy recovery technology has been developed by direct gasification of sewage sludge. However, the reduction of tar emissions due to the blockage of by-product tar adhering to pipes has been an issue. In this technology, we established elemental technologies by March 2023, developing a unique circulating fluidized bed equipment that uses inexpensive natural ore with tar reforming function as a medium, as a new type of gasification reforming system, and achieving continuous and stable operation.

As a new step towards the practical application of this technology, from October 2024, we will receive dehydrated sludge samples and sewage treatment field provision from Kagoshima City, and install a 2-ton (wet basis)/day scale pilot plant at the city's Southern Sewage Treatment Plant for field tests until March 2026.

In the test, Hitachi Zosen will conduct verification of the total system related to the sewage sludge gasification power generation process using a gas engine, with the main purpose of using the obtained fuel gas for electric power. If this system can be put into practical use, it will not only eliminate the requirement for digested sludge processing, but also convert sludge-derived fuel gas into electricity. This electricity can then be used for the sewage treatment plant itself, contributing to a more environmentally friendly sewage treatment process. In addition, Furthermore, in anticipation of the emergence of a hydrogen-based society and the potential for chemical recycling, Hitachi Zosen will undertake initiatives to realize a circular economy. This includes exploring ways to utilize fuel gas that align with the societal and regional needs around Kagoshima City.

The “Energization of Sewage Sludge (Energy Creation)” is one of the initiatives put forth in the "Green Innovation Sewerage" vision proposed by the Ministry of Land, Infrastructure, Transport and Tourism. It is listed along with the "advancement of incineration" as one of the strategic efforts. Hitachi Zosen is actively working on the development of sewage sludge incineration technology using the stoker method, with an extensive track record in waste incineration. In addition to this, the company is also committed to actively contributing to the energy generation from sewage sludge in this demonstration project.

- ※1: This refers to the process of infusing oxygen into water. In sewage treatment, microorganisms decompose sludge, and an aeration process is established to stimulate the activity of these microorganisms by constantly supplying oxygen.
- ※2: This refers to the sludge that remains after the digestion process. Generally, about 60% of the original sludge volume remains as digested sludge after the treatment process.

The outline of the project:

1. Venue : Kagoshima City Southern Treatment Plant
2. Duration : October 2024 to March 2026
3. Capacity : Approx. 2 tons/day (Wet basis)

(Reference)

Inquiries about collaboration with AIST Solutions and AIST

<https://www.aist-solutions.co.jp/contact/form.html>