

# Joint Research on Sludge Reduction Technology as a Total Energy System

Year of Research

2011 · 2012

Establishment of energy and resource recycling

**(Purpose)**

The purpose of this research was to clarify the benefits of the introduction of the technology through case studies so that it may be of use when investigating the introduction of technology that both reduces sludge and recovers energy simultaneously. The benefits of energy recovery were studied assuming unused energy such as waste heat in the incinerator is used in the solubilization facility.

**(Results)**

The selected scales of treatment plants were approximately 3,500, 7,000, 14,000, and 28,000t-DS/year, considering the capabilities of their sludge solubilization facilities. 9 case studies were conducted. One of the case studies is described in the following example. The removal system of this treatment plant is a separate sewer system with the expected maximum daily wastewater flow of 370,000m<sup>3</sup>. **Figure 1** shows the calculation results of the cost reduction effect for the project. If this technology is introduced, the treatment process can be performed with two digestion tanks whereas three digestion tanks are required in the existing facility, which results in a cost reduction. In addition, the treatment process can be performed with 3 dewaterers while eight dewaterers are required in the existing facility, resulting in a cost reduction equivalent to 4 dewaterers when a spare unit is taken into account. The treatment process can be performed with 1 incinerator whereas 3 incinerators are required in the existing facility, resulting in a cost reduction equivalent to 1 incinerator when a spare unit is taken into account. The amount of sludge cake generated was 145 (t-wet/day) before the introduction of this technology while the amount of sludge cake generated was reduced to 55.1 (t-wet/day) with a sludge reduction of 62% in volume after the introduction. The cost reduction for the project is calculated to be -444 million yen/year compared to the facility without the technology. However, as the construction of this technology is carried out in stages while considering the overall plan specific to each treatment plant, the cost reduction for the project may vary between treatment plants depending on the performance of the existing facility and differences in the number of units.

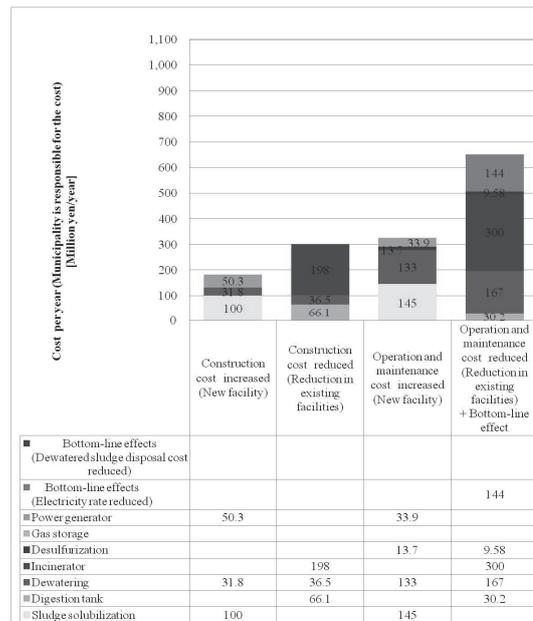


Figure 1. Cost reduction effect for the project

Table 1. Rate of power generation

Method Item	Operation	Conventional incineration flow	Improved incineration flow
	Normal operation (Without use of waste heat)	(Without white smoke prevention)	(Without white smoke prevention)
Quantity of gas that can supply power generation	15,700 (Nm <sup>3</sup> /day)	15,900 (Nm <sup>3</sup> /day)	18,300 (Nm <sup>3</sup> /day)
Power generated	12,000 (MWh/year)	12,200 (MWh/year)	14,500 (MWh/year)
Self power generating rate	26.8 (%)	27.2 (%)	32.3 (%)

If this technology is introduced, the power consumption will be reduced by approximately 5.4% compared to facilities without the technology. **Table 1** shows calculation results for the rate of power generation. The rate of power generating was calculated to be 26.8% when the solubilization facility is introduced. When heat is recovered from the incinerator, the power generation rate was calculated to be 27.2%. When heat is recovered from the incinerator, the power self-sufficiency is calculated to be 32.3% for the improved incinerator (future effect) in which the maximum energy recovery is taken into account.

**(Conclusion)**

In this study, a case study for the introduction of this technology was conducted in an actual treatment plant. The results show that the introduction of this technology is effective in terms of reducing production cost and achieving energy recovery. These research results are provided in the "Manual for the introduction of energy recovery and sludge reduction technology".

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Key words

Sludge volume reduction, energy recovery, energy reduction, cost reduction