Research on the Efficiency of Energy-Saving Technologies in Sewage Treatment

Year of Research	2007	

(Purpose)

The general thrust in the promotion of energy conservation and renewable energies as measures to combat global warming in sewage treatment, including governmental targets for reducing CO_2 emissions and specific measures for achieving those objectives, was outlined in the "Shigen no Michi" (Passage of Resources) program. However, sewage plant managers have only just begun to take practical steps toward implementing the program, and except for a few plants that are required to set energy reduction targets under the Energy Conservation Law, energy-saving measures at present have been left to the plant managers' own initiatives.

The likely scenario, when plant managers are at the stage to implement practical measures, is that most of them will have an inadequate grasp how energy usage can be effectively reduced in a treatment plant. This is borne out by a government survey conducted in 2006, which found that many plant managers wanted government support in making energy savings.

Our research grew out of the current state and issues surrounding energy conservation in sewage treatment. It was undertaken with the aim of promoting energy conservation through the establishment and quantitative formulation of standardized methods for measuring energy-saving performance in order to objectively assess the effects and efficiency gains of energy-saving technologies.

This project was part of a joint research program by industry, universities, and government organizations on general trends and developments in new technologies that involve the resource utilization of sewage sludge, with particular emphasis on investigating quantitative methods for assessing the efficiency of new technologies.

(Results)

① Energy-saving technologies of particular interest were selected for quantitative performance assessment, and practical computational methods were examined. Ways of measuring energy-saving performance were then devised, using indices of energy consumption efficiency set for each technology. The indices were worked out according to the computational method set for each type of equipment. The following table lists examples of the energy-saving technologies studied.

Table1: Examples of investigated energy-saving technologies and proposed indices

Equipment	Energy-saving technology	Index
Primary and final settling tanks	Installation of energy-saving sludge skimmer	Power consumption / water surface area (kW/m^2)
Blower system	Use of micro-bubbles	Power consumption / oxygen transfer efficiency (kW/%)
Advanced treatment system	Installation of energy-saving agitator	Power consumption / tank capacity (kW/m^3)
Sludge thickening system	Installation of energy-saving sludge thickener	Power consumption / treatment volume ($kW/(m^3/h)$)
Sludge dewatering system	Reduction in mechanical dewatering power	Power consumption / treatment volume ($kW/(m^3/h)$)

② Two types of technologies -- used in aeration diffusers and in reactor tank agitators -- were chosen for trialing as technologies that are involved in advanced treatment systems and which promise significant energy savings. Interviews about the results were conducted with both the providers and users of the technology, and points to be borne in mind at practical application were identified.

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