

Joint Research on Energy Management of Wastewater Treatment Plants

Year of Research

2007 • 2008

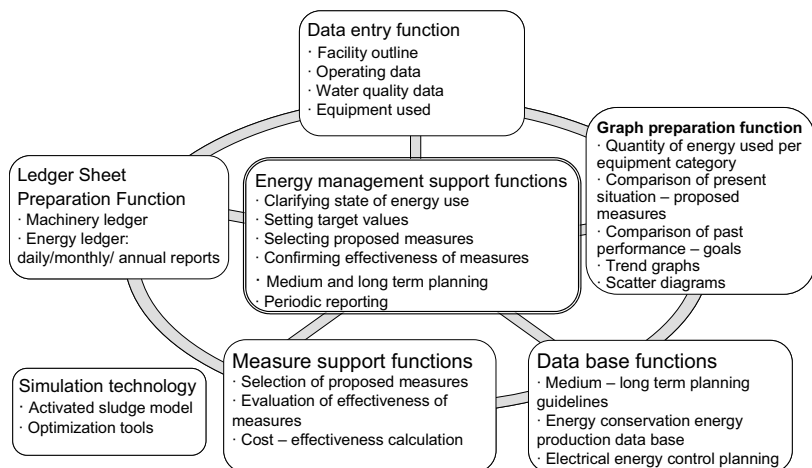
(Goal)

The goal of the research is to reduce specific energy consumption at wastewater treatment plants which became designated energy management factories with the April 2006 revision of the Law Concerning Rational Use of Energy (Energy Conservation Law) by an average of at least 1% per year, a task which, considering conditions characteristics of wastewater treatment plants, requires the performance of extremely precise work. An examination of changing energy consumption by wastewater treatment plants throughout Japan shows that the consumption per unit is almost flat and adequate energy conservation effects have not been obtained.

The goals of this research are to clarify efforts to conserve energy at wastewater treatment plants and problems which must be resolved to do so, to inventory common management methods and challenges, revealing technical issues concerning energy conservation measures, and at the same time, to summarize the basic specifications of a Wastewater Energy Management System (WEMS) which manages and analyzes energy, as a technical document (see Fig. 1).

(Results)

The present state of management was studied, mainly through interviews and a questionnaire survey at wastewater treatment plants, and the functions and structure of energy management were clarified based on case studies. Specifically, ① selection of operating data and management data necessary for energy management, ② data utilization methods for abstracting proposed measures, ③ use of a data base, and ④ proposed measure evaluation methods, etc. Table 1 shows the equipment studied at 5 treatment plants, priority proposed measures, and energy reduction effectiveness.



(Note) Simulation technologies are not included in the functions of WEMS
Figure 1. Configuration of Functions of WEMS

Table 1. Specific Energy Consumption Reduction Effects of Priority Proposed Measures

Equipment studied		Pump and grit chamber	Wastewater treatment①	Wastewater treatment②	Sludge treatment①	Sludge treatment②
Outline	Daily maximum	383,000m ³ /d	101,000m ³ /d	273,000m ³ /d	11,500 t/d	1,688 m ³ /d
	Treatment method	Conventional activated sludge process + A ₂ O	Conventional activated sludge process	Conventional activated sludge process + A ₂ O	Thickening, dewatering, incineration	
Priority proposed measures and reduction effects	Priority item ①	Automatic control and high water level operation of main pump	Improvement of supplied air flow	Improvement of supplied air flow	Dewatering machine sludge transport time reduction	Fluidizing blower, induced draft fan flow control by speed
	" ②	Energy conservation type electric motor powered main pump	Intermittent aeration of antifoaming spray	Improvement of agitator control method	Energy conservation type electric motor	Introduction of an energy conservation type electric motor
	" ③	—	Improvement of agitator control method	Return sludge pump control	—	—
	Specific energy consumption reduction effects	0.43%	4.72%	1.41%	0.52%	3.02%

(Research achievements)

Technical Documents Concerning Energy Management of Wastewater Treatment Plants were prepared to present the achievements of the research.

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Key words

Energy Management System (WEMS) Energy Management, Energy Conservation