

## Research on electric energy control in sewage treatment plant

Whole term

2001.5 ~ 2003.3

### (Purpose)

In recent years, greenhouse gas reduction targets have been defined with the purpose of curbing the global warming caused by consumption of the materials and energy. In Japan “Law Concerning the Promotion of the Measures to Cope with Global Warming” is enforced and “Law Concerning the Rational Use of Energy” is amended wherein sewage business is included as one of the subjects. For sewage business, it is necessary to meet the requirements for the increased energy consumption due to employing advanced treatment facilities and energy management when complying with ISO14001.

As sewage facilities intrinsically consume much energy in the form of electrical power and fuel, active efforts to meet the energy-saving requirements are social needs. We are in the era of maintenance and management as long as sewage business is concerned and renovation and refurbishment of the facilities tend to increase.

In the light of the situations aforementioned, this joint research is to produce technical documents used when developing an energy saving plan, utilizing electrical power as a main resource, based on the research and development from the view point of “curbing the existing energy” and “usage of yet-to-be-used energy” with respect to the energy saving included in the energy management plan of sewage treatment facilities category.

### (Result)

#### 1) Extraction and identification of elements pertaining to “curbing the existing energy”

With regard to efficient operation of electrical facilities in sewage treatment facilities considering curbing electrical energy, applicable technologies are identified according to the aspects of “prevention of electrical loss due to resistance” and “rationalization of converting electricity to power and heat”.

#### 2) Research on applicable technologies for “usage of yet-to-be-used energy”

Sewage retains a lot of energy in its drainage, treated water and sludge when discharged by municipal activities since part of it contains hot waste water as a result of citizen’s daily life and industrial activities. Another natural yet-to-be-used energy which could be used in sewage treatment facilities is sunlight and wind, contributing to curb electrical energy. As for the following yet-to-be-used energy, outline and introduction procedures of their usage technologies are defined.

- Heat contained in the sewage
- Micro hydraulic (low head) power generation
- Digestion gas power generation
- Sunlight power generation
- Wind power generation

#### 3) Research and analysis of the existing sewage treatment facilities

Items required to grasp the energy usage of the existing facilities are confirmed and sorted out based on the results of the questionnaire and site hearing about energy usage conducted at five facilities selected nationwide.

The criteria in selecting the facilities include: the period of their service start is early (around 1966 to 1981); medium to large sized facility with its planned daily treatment amount is around 33,470 to 126,000m<sup>3</sup>; and the standard activated sludge method, appropriate considering the size of the facility, is employed for the water treatment.

#### 4) Consideration by case studies

Case studies are conducted based on the estimated electrical energy unit obtained through curbed consumption of the existing energy and utilization of the yet-to-be-used energy by analyzing the data obtained at the facilities and extracting the items to be curbed. It is found that the electrical energy unit can be improved by about 16.4 to 30.5% by employing high-efficiency generator, improving the thickner control and using digestion gas.

### (Future tasks)

This research focuses on electrical energy among the energies used in sewage treatment facilities. Furthermore, in the information of electrical instrumentation facilities and auxiliary equipment to the structures, it seeks how efficiently electrical energy curbing is achieved, apart from a view point of mechanical facilities. However, when developing an actual plan for energy curbing,

comprehensive verification of heat energy and mechanical facilities is required. We hope that this research would form fundamental information for energy-curbing technology researches.

Collaborators: Japan Institute of Wastewater Engineering Technology, MEIDENSHA Corp. Hitachi Ltd. Toshiba Corp. Mitsubishi Electric Corp. Fuji Electric Holdings Co., Ltd.

Person in charge of study: Takaso Tsuneto, Kodama Takuro, Masuoka Shuichi, Shirota Takeshi

**Keywords**

Energy conservation, Electric installation, Electrical energy, Energy control, Unutilized energy