Surveillance study on plan decision of energy conservation type sewer system using force of the wind

Whole term	2002.2 ～ 2002.3	

(Purpose)

Since efforts for energy saving in sewage business have focused on improving efficiency in sewerage itself and sludge management, saving energy of treatment facilities and efficient utilization of unused energy (such as digestion gas) generated through the treatment process, there have been less examples in which natural energy utilization reduces the use of electrical energy. Bringing the wind power generation, installed in the space of the sewerage facility, to the sewerage business is expected to supplement the power consumed by the sewerage and contribute to reduce CO_2.

Commencement of common use of Shonai Purification Center for the lower Mogamigawa River basin sewage completed the regional sewerage business originally planned including constructing sewage mains and sludge treatment facilities in Yamagata prefecture. While efforts have been made to increase dissemination rate of the sewerage per capita, a variety of problems in maintenance and management of the system have started to be revealed. Among other prefectural facilities, Shonai Purification Center has the highest management/maintenance cost and its reduction has become an issue to be immediately addressed.

This research is to reduce the management/maintenance cost the facility by cutting the electrical expenses required for sewage treatment through the employment of “energy-saved sewerage system with wind power”. It also intends to curb CO_2 emission for prevention of global warming. In 2001, a fact-finding survey of neighboring wind-power plants, size setting of thunders requiring proactive measures of facilities and an earth resistivity surveying are carried out.

(Result)

(1) Fact-finding survey of neighboring wind-power plants

The survey is conducted on two wind-power plants, Tappi Wind Park in Aomori prefecture and Tachikawa Wind Farm in Yamagata prefecture, located in Tohoku area along the sea of Japan, same as Shonai Purification Center, in order to grasp the problems. Failures of the power generation equipment were found soon after they are installed since adjustments according to the topographical characteristics and the linkage among the system were required. Those failures are found to be decreased by the year through corrections and adjustments on a case-by-case basis.

(2) Setting lightening stroke current and energy

Since the region around Shonai Purification Center tends to have frequent thunderbolts especially in winter, setting the current and energy of lightening strokes is discussed.

The discussion concludes that the lightening stroke current is set at 100kA (with a probability of every 16 years), the biggest probable value that would occur in 17 years, the life of the wind-power facility.

(3) Measurement of an earth resistivity

A measurement of an earth resistivity is conducted for the facility’s earth design against thunderbolts.

Although the mesh method is also an option since there is a layer near the ground surface satisfying the conditions, the result finds that the deep boring is the most effective and safe method to obtain stable earthing resistance, which is least vulnerable to seasonal changes,.

(Future plan)

Establishing an energy-saving sewerage system in the light of the actual design and construction and conducting a survey of effects on the ambient surroundings are planned. Moreover, measures against thunderbolt damages will be discussed based on the standard values of the lightening protection and the earth resistivity, defined in 2001.

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Keywords	Energy conservation type sewer system, Wind power generation, Cost reduction, Global warming prevention