

## 4-3-2 Reduction of Electricity Costs at wastewater treatment facilities by Implementation of “Peak Shift”

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**Keywords:** Increase in electricity charges; the peak shift of electric power; Sewerage Facilities; Electric Power Reduction

### INTRODUCTION

After the Great East Japan Earthquake occurred on March 11th 2011, the power company increased tariff because of the suspension of nuclear power plant operation and increase in natural gas use. The Bureau of Sewerage, Tokyo Metropolitan Government (BSTMG) has been greatly affected by the increase in electricity costs. In fiscal year (FY) 2010, the electricity consumption was 1,010 million kWh. With the implementations of several saving measures, this was brought down to 953 million kWh in FY 2012, which is a reduction of 57 million kWh from the two FY.

However, despite the reduction in electricity consumption, the electricity cost in FY 2012 was 16.1 billion yen, while it was 13.1 billion yen in FY 2011. It was a rise of 3 billion yen or 23 % up from the previous FY due to tariff increase. This is affecting the operational expenses and the reduction of electricity costs remains a pressing issue. (Figure 1.1)

### REDUCTION IN ELECTRICITY TARIFF BY “PEAK SHIFT”

Among the implemented measures for reducing electricity costs, use of energy-efficient equipment and energy saving efforts achieved a certain reduction in electricity consumption. As a next step, we considered to “peak shift” by making use of the “peak hour modulation contract”. “Peak hour modulation contract” is a pricing policy of discounted electricity rates set by power companies to limit the demand during the summer peak season from 1:00 p.m. to 4:00 p.m., which is peak hours of demand. The key measure for the reduction in electricity costs was considered to “peak shift” which is shifting the timings for equipment operations from on-peak to off-peak hours. Our activities and their effects are shown and discussed in the paper.

#### *Adjustment to the lift pump operation hours by sewer storage*

Eighty percent of the sewer lines in the Tokyo districts are the combined system, which has the capacity to store sewage on dry weather days since the sewer capacity is designed based on the wet weather flow. In the pump facilities or the water recycling centers, we reduced on-peak pump operating hours by storing the sewage in trunk sewer lines on dry weather days. The stored sewage was lifted during off-peak hours.

#### *Reduction in the number of blowers in operation*

In our wastewater treatment process by activated sludge, the blowers that supply air to the biological tanks consume the most electricity. The water quality management department and the operations management department worked together to determine the minimum air flow that does

not affect the effluent quality and reduced the number of blowers in operation during the on-peak hours. .

*Utilization of sodium-sulfur battery*

Sodium-sulfur (NaS) battery is a large capacity battery which is charged at off-peak hours for the use of power at on-peak hours. BSTMG introduced NaS battery in 2001 to reduce peak demand while serving as emergency backup. By adjusting the timing of NaS battery operations, the on-peak power use could be suppressed substantially.

With implementations of the three methods, the power consumption between 1:00 p.m.to 4:00 p.m. hours in the summer of FY 2013 was reduced by about 41,000kW, which translated into a cost saving of 900 million yen.

**ADVANCEMENT OF THE “SMART PLAN 2014”**

In June 2014, BSTMG drew up an energy master plan for sewerage called the “Smart Plan 2014”. In this plan, more extensive energy reduction measures are shown to reduce the effects of rising tariff of electricity, such as further reduction in electricity consumption, switching to energy-efficient equipment, and managing energy in wide areas. By implementing the master plan, BSTMG will continue to work for sustainable sewerage service by achieving sustainable energy management.

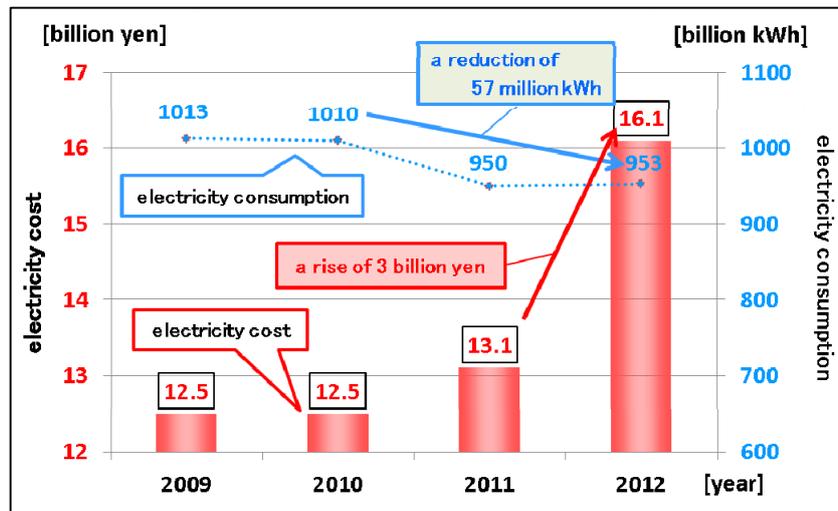


Figure 1.1 Change of electricity costs at wastewater treatment facilities 2009-2012.