



WASTEWATER TREATMENT PLANTS USE

LARGE AMOUNTS OF ELECTRICITY TO DRIVE

PUMPING AND AERATION SYSTEMS, AS WELL

AS OTHER CROSSCUTTING TECHNOLOGIES

ESSENTIAL TO THE TREATMENT PROCESS.

WHEN A WASTEWATER TREATMENT PLANT IS

BUILT OR UPGRADED, PROPER DESIGN AND

CONFIGURATION OF THESE SYSTEMS IS

ESSENTIAL FOR OPTIMAL PERFORMANCE

AND ENERGY EFFICIENCY.

WHEN DESCRIBING THE NEW FACILITY, ROB

FOWLER, THE DSRSD PLANT MANAGER,

SAID, "PG&E'S SAVINGS BY DESIGN

PROGRAM INSPIRED US TO LOOK AT ALL OF

OUR SYSTEMS FROM AN ENERGY

MANAGEMENT PERSPECTIVE."

Wastewater Treatment Plant Achieves Energy and Resource Savings with Efficient Design

Before expanding their wastewater treatment plant, managers at the Dublin San Ramon Services District (DSRSD) explored ways to make the design more energy efficient. Their goal was to reduce total energy use of treatment processes and gain the ability to recycle treated water while increasing the plant's capacity. To determine how to achieve their goal, they worked with engineers from PG&E's Technical and Land Services Department, who analyze new or expanding industrial plants under a statewide investor-owned utility sponsored energy efficiency program, Savings By Design (SBD). The ensuing expansion project enabled the DSRSD to process 48% more wastewater more efficiently.

The Dublin San Ramon Services District

The DSRSD operates a regional wastewater treatment facility serving over 120,000 residents in the Dublin and San Ramon area. Before the redesign project, the plant treated approximately 11.5 million gallons per day using an activated sludge process with effluent filtering and fine bubble aeration. Due to population growth, it became necessary to expand the plant's treatment plant capacity to 17 million gallons per day. DSRSD also decided to construct a sand filtration recycled water treatment plant and distribution facilities to provide water to irrigate parks, school grounds, golf courses, and roadway medians.

To meet expansion requirements, the plant needed more aeration tanks and greater aeration blower capacity. Because aeration fans can account for as much as half of a wastewater treatment plant's total energy consumption, DSRSD staff were particularly vigilant about the efficiency of this process. The engineering analysis showed a single-stage fan was more costly than a multi-



stage unit, but the annual energy consumption was 31% lower. This convinced DSRSD management to install the single-stage aeration fans.

To maximize overall plant energy efficiency, DSRSD implemented several additional energy efficiency measures that qualified for SBD incentives. In the secondary treatment process, they installed premium efficiency motors on the pumps and redesigned the system to reduce head loss. While the existing pumps were already fitted with high efficiency motors, DSRSD personnel felt that the extra savings afforded by premium efficiency motors would help mitigate potential increases in energy costs.

The existing secondary treatment process required the effluent to be pumped against 5.75 feet of head before reaching the effluent pump suction well. This caused the plant to use more energy to move the effluent. To improve this situation, DSRSD personnel redesigned the secondary treatment process by raising the water level in the secondary sedimentation tank and locating the recycled water facility closer to the process. Recycling the water eliminated the need to pump the effluent 16 miles away into the San Francisco bay.

To disinfect the recycled water, DSRSD staff evaluated two different types of ultraviolet (UV) lamps. While the UV lamp system selected was 50% more costly and required more space, it was 64% more efficient than the alternative. This increase in energy efficiency was too compelling to decline. Finally, staff at the DSRSD decided to install premium efficiency pump motors with variable speed drives (VSD) on the recycled water effluent pumps. While the alternative, fixed-speed pumps, were less costly and capable of managing fluctuations in flow rates, the greater energy efficiency of the premium efficiency VSD units enabled the DSRSD to meet their goal of maximum energy efficiency.

Project Successes and Lessons

DSRSD was able to increase the capacity of their wastewater treatment plant, while improving the energy efficiency of the overall plant. They are now able to treat 48% more wastewater for the residents of Dublin and San Ramon. The plant's annual energy use savings were estimated to be 2,232,000 kWh and the annual energy cost savings were estimated to be \$290,000. This enabled the DSRSD to earn a total of \$67,000 in incentives from PG&E. The new plant cost an additional \$2,209,000 more than a less efficient one, yielding a simple payback of 6.6 years.

ACCORDING TO OPERATIONS MANAGER, MIKE SPOHWN, THEN ACTING SUPERVISOR FOR THE ELECTRICAL AND INSTRUMENTATION DIVISION, "WE WORKED WITH OUR PG&E REPRESENTATIVES TO IDENTIFY OPPORTUNITIES FOR ENERGY EFFICIENCY IN OUR PUMPING SYSTEMS AND IN THE REDESIGN OF THE WASTEWATER TREATMENT PLANT AERATION SYSTEM PRIOR TO CONSTRUCTION. THE SAVINGS BY DESIGN PROGRAM OFFERED A GREAT INCENTIVE AND A LONG TERM RETURN IN ENERGY SAVINGS ON OUR INVESTMENT."