

CASE STUDY



New Construction - Wastewater Treatment: Pumping and Aeration Systems



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. PG&E's program offered a great incentive and a long term return in energy savings on our investment.

Mike Spohn, Operations Senior Electrical/Electronics Technician Electrical and Instrumentation Division, DSRSD

WASTEWATER TREATMENT PLANT ACHIEVES ENERGY AND RESOURCE SAVINGS WITH EFFICIENT DESIGN

Before expanding their wastewater treatment plant, managers of Dublin San Ramon Services District (DSRSD) explored ways to make the plant 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 representatives from Pacific Gas and Electric Company (PG&E), who analyze new or expanding industrial plants under a PG&E energy efficiency program.

The ensuing expansion project enabled DSRSD to process 48 percent more wastewater, and do so more efficiently.

DUBLIN SAN RAMON SERVICES DISTRICT

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 of wastewater per day using an activated sludge process with effluent filtering and fine bubble aeration. Recent regional population growth demanded an expansion of 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.

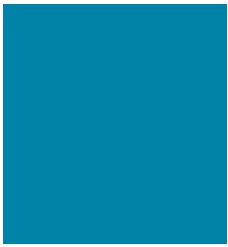
The expansion requirements called for additional aeration tanks and greater aeration blower capacity. Because aeration fans can account for as much as half of a wastewater treatment plant's total energy consumption, DSRSD staff was particularly concerned that the efficiency of this process be maximized. Consequently, DSRSD management chose to install single-stage aeration fans based on PG&E's engineering analysis showing a single-stage fan to be more costly than a multi-stage unit, but its annual energy consumption to be 31 percent lower.

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

The existing secondary treatment process required excess energy to pump the effluent against 5.75 feet of head before reaching the effluent pump suction well.

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 to 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 percent more costly, and required more space, it was 64 percent more efficient than the alternative. Finally, staff at 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 DSRSD to meet their goal of maximum energy efficiency.

This enabled DSRSD to earn a total of \$67,000 in incentives from PG&E. While the new plant cost \$2,209,000 more to build than a less efficient one, its annual energy savings and the incentives earned means that it will pay for itself in 6.6 years – and then continue to save the District money and energy.

HOW CAN PG&E HELP?

PG&E's energy management solutions can help you control your operating expenses through building energy efficiency and demand response capabilities into your new and existing facilities, and your long-range planning. Services include energy analyses of existing facilities, design assistance for planned projects, equipment rebates, project incentives, and education and training. For more information call **PG&E's Business Customer Center** at **1-800-468-4743** or visit pge.com/business.

PROJECT RESULTS

- \$290,000 annual energy cost savings
- 2,232,000 kWh annual energy savings
- \$67,000 program incentives from PG&E
- 48% increase in treatment capacity

PROJECT SUCCESSES AND LESSONS

By working with PG&E representatives to redesign its wastewater treatment plant, DSRSD was able to increase plant capacity while improving its overall energy efficiency. The district is now able to treat 48 percent more wastewater for the residents of Dublin and San Ramon. The plant's annual energy use and cost savings were estimated to be 2,232,000 kWh and \$290,000, respectively.



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.

Rob Fowler
Plant Manager, DSRSD



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