SUCCESS STORY

East Bay Municipal Utility District
Special District 1, Wastewater Treatment

Service Area: **83 square miles**
Wastewater System Capacity: **415 million gallons per day**
Wastewater Treatment Type: **Secondary**
Secondary Treatment Method: **Activated Sludge**
Annual Cost of Purchased Electricity: **$1,922,000 (30 million kilowatt hours)**
Installed Cogeneration Capacity: **7.1 megawatts**
Annual Savings Attributed to Energy Efficient Strategies: **$2,796,000**

The East Bay Municipal Utility District Wastewater Department serves more than 600,000 residential and 20,000 commercial customers in seven San Francisco Bay communities. Since the early 1980's, the East Bay Municipal Utility District has explored and implemented strategies to increase the system's energy efficiency. As the district's mission has expanded, the East Bay Municipal Utility District has upgraded equipment and process methods to retain high-quality standards while reducing energy costs.

Energy efficient strategies such as adding plastic balls to prevent evaporation and heat loss in the oxygen production pit, shown here, save EBMUD over $2 million each year.

Staff at the Special District 1 Wastewater Treatment Plant implemented the following key improvements:

- Cogenerate electricity and thermal energy on site from waste methane
- Install high-efficiency influent and effluent pumps, high-efficiency motors, and variable-frequency drives
- Discontinue second-stage activated sludge mixing
- Add plastic balls to prevent heat and evaporation losses in the oxygen production vaporizer pit
- Inter-tie pipes on gas recirculation blowers to allow one blower to serve two mixing tanks
- Discontinue use of one digester reactor and increase off-peak pumping in other reactors to compensate
- Replace two small compressors at the pure oxygen plant with one large unit

The above modifications were enhanced by using a distributed control system to pace influent pump flow, control water storage, and perform selected pumping off-peak to take advantage of lower utility rates. These improvements have reduced total plant energy costs by about 60%.

The following sections highlight improvements that significantly decreased energy use.

COGENERATION

The East Bay Municipal Utility District's on-site cogeneration plant has three 2,368 kilowatt engine generators, but currently operates no more than two at a time. These engines, which burn waste methane produced by the facility's digesters, are presently undergoing efficiency upgrades. Brought on-line in 1985, the station generates about half of the facility's energy needs. The East Bay Municipal Utility District is considering installing a digester cover that would store gas at night, creating a temporary reserve that could be tapped during peak demand periods.

Benefits

By supplying 40–50% of the facility's electricity, the East Bay Municipal Utility District's cogeneration station reduces electricity costs. Thermal energy recovered from the engines is used to maintain an optimal anaerobic digester temperature and to provide building heating.

HIGH-EFFICIENCY PUMPS/MOTORS WITH VARIABLE-FREQUENCY DRIVES

The East Bay Municipal Utility District replaced five old 700 horsepower influent pumps and motors and four old 1000 horsepower effluent pumps and motors with high-efficiency pumps and energy-efficient motors. Variable-frequency drives were installed on all nine motors. The district now has a policy of replacing worn-out motors with energy-efficient motors.

Benefits

Upgrading to high-efficiency pumps and motors equipped with variable-frequency drives has cut the electrical use required to run influent and effluent pumps by 50%, without adversely affecting the quality of wastewater treatment.

DISCONTINUE SECOND-STAGE ACTIVATED SLUDGE MIXING

As the second stage of a continuous process, the East Bay Municipal Utility District used to mix sludge after adding microbes and oxygen to ensure continued activity of the microorganisms. After finding this mixing wasn't necessary for sludge breakdown, however, they discontinued this step.

Benefits

By discontinuing second-stage mixing, the East Bay Municipal Utility District saves the energy

and upkeep formerly required for operating four 150 horsepower mixing motors 24 hours a day.

Energy Efficiency Improvement	Annual Baseline Energy Cost	Annual Post-Implementation Energy Cost	Annual Estimated Savings
Cogenerate electricity and thermal energy on-site from waste methane	$4.6 million	$2.9 million	$1.7 million
Install high-efficiency pumps and motors with variable-frequency drives	$535,000	$262,000	$273,000
Discontinue second-stage activated sludge mixing	$223,000	$0	$223,000
Add plastic balls to oxygen production vaporizer pit	$397,000	$199,000	$198,000
Inter-tie pipes on gas recirculation blowers	$167,000	$0	$167,000
Discontinue use of one digester	$158,000	$0	$158,000
Replace two small compressors at the pure oxygen plant with one large unit	$618,000	$541,000	$77,000
Estimated Total Annual Savings			**$2.796 million**

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