

## Water/Wastewater Case Study:

# *Vallejo Sanitation and Flood Control District*

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### **Background**

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- Type of Agency: Wastewater
- Location: Vallejo
- Size: 85 employees
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### **Summary**

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Over the past several years, Vallejo has worked with internal staff, Pacific Gas & Electric (PG&E) and the California Energy Commission (CEC) to develop energy-reducing projects and take advantage of energy rebates programs. The impetus for such programs has been to seek the most cost effective treatment of wastewater and financial rebates and grants to fund such projects. The district embarked on five projects in 2001, all of which are expected to result in a projected energy cost savings of \$189,000 and rebates of \$737,000. The programs included motor replacements, lighting retrofits, installation of motion sensors, installation of variable frequency drives (VFDs) and the CEC's generation replacement program. The standby generator replacement project alone will save the district \$168,000 annually. Vallejo employees contributed significantly to the planning, implementation and monitoring of the projects.

Referenced in Water/Wastewater Guides:

- #1, "Reduce Energy Use in Water and Wastewater Facilities Through Conservation and Efficiency Measures"

### **Plan**

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Energy Power Research Institute (EPRI) funded an energy assessment by consultant HDR Engineering for Vallejo's plant. EPRI funded Vallejo's energy assessment as part of EPRI's "Municipal Water and Wastewater Program - Energy Optimization Evaluation."<sup>3</sup> From key employee interviews and operational data reviews, HDR collected operational procedures, including what and how equip-

ment was operated and chemical, electrical and gas usages. HDR then analyzed the data and used it to determine the cost effectiveness of projects either as stand-alone or in conjunction with energy rebates.

The plant manager initiated the projects and the employees in the electrical and mechanical departments implemented them. The plant manager chose to focus first on the projects that had the quickest payback, generally of five years or less.

Vallejo Sanitation's goal in 2001 were to seek the most cost effective treatment of wastewater and financial rebates/grants where possible to implement cost saving measures. In order to qualify for generator replacement rebates, the agency needed to design and complete the project in a short time.

### **Programs: Conservation**

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✓ **Lighting controls:** Installed, as part of a PG&E program, 100 motion sensors throughout the district, including remote pump stations.

✓ **Motor controls:** Installed power meters (watt transducers) on electric motors tied to the distributed control system. The controls allowed staff to set wet levels and control sequences throughout a 60 MGD treatment facility. The controls were installed as part of treatment facilities improvements done over several years and at three different construction sites. Currently, Vallejo has 30 controls.

### **Programs: Efficiency**

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✓ **Lighting:** Replaced approximately 600 fluorescent lamps with more energy-efficient lighting, as well as replaced T12s with T8s and electronic ballasts as part of PG&E's Energy Efficient Lighting and Electronic Ballast Replacement Program.

3. EPRI sought two water agencies, one large and one small, from both Southern and Northern California to provide a one-time grant to fund an energy assessment. EPRI approached Vallejo and asked if the district was interested in participating.
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✓ **Motors:** Replaced a throttling valve operation and two 15-horsepower motors with two 50-horsepower motors and VFDs.

✓ **VFDs:** Installed four VFDs. PG&E provided funds for VFD installation on fixed speed motors as well as for the replacement of older inefficient VFDs.

✓ **Alternative and/or renewable energy sources:** Participated in the CEC's "Distributed Generation Retrofit Program for Water/Wastewater Facilities."<sup>4</sup> This program gave Vallejo Sanitation a grant of \$720,000 to replace 2.6 MW of existing diesel generators with 2.4 MW of Level 1 BACT rated natural gas fired engine generators. To qualify for the grant, Vallejo had to design and build quickly. The district fulfilled obligations with no time to spare, taking plant load with generators on last day allowed. Vallejo intends to operate the generators to reduce on-peak demand, running the generators at least six hours a day to drop the demand charges and avoid peak power costs of \$.17 /kWh, and possibly six hours of partial peak load, which costs \$.11 / kWh. The estimated cost of operation for the generators is \$.07 / kWh.

### **Programs: Employee Outreach**

✓ **Communication:** Reported the status of the all conservation and efficiency projects to employees in regularly scheduled meetings. Employees were interested as they were affected directly by motion sensors and the light retrofitting issues.

✓ **Incentives:** The district began an incentive program that provided 10 percent of the first years savings in cash to the employee who suggested the cost saving project. The largest award to date was \$5,200.

4. This CEC program provided incentives for water/wastewater agencies to replace or retrofit existing diesel and gas generating engines with natural gas and diesel reciprocating engines with BACT emission control, micro turbines, energy recovery systems, fuel cells and solar and wind systems. The agency that participates has to agree to operate the equipment during peak power usage and anytime a Stage 3 Alert is declared for a period of three years from the date of installation.

### **Budget and Finance**

Because many of the projects were expected to deliver a payback in less than a year, most were financed by operating funds, usually out of the electrical budget.

Vallejo Sanitation's generator program cost \$2,411,000. Estimated payback is six years with \$120,000 non-firm program, 10 years without. The motor replacement program cost \$21,000. The total implementation cost of the 2001/02 programs was \$2,557,500.

### **Results**

Vallejo Sanitation's 2001/02 programs are expected to deliver impressive overall results: 2,354,000 kWh in annual energy savings, \$332,000 in annual financial savings and \$737,000 in rebates.

The estimated energy and financial savings for each program were as follows:

- Motion sensors: 125,000 kWh and \$15,000/year.
- Lighting retrofits: 166,000 kWh and \$20,000/year.
- VFD installation: 625,000 kWh and \$75,000/year.
- Motor replacement: 450,000 kWh and \$54,000/year.
- Generator program: 988,235 kWh and \$168,000/year.

Vallejo Sanitation received the following rebates:

- \$2,500 from PG&E for motion sensors.
- \$26,000 from PG&E for VFD replacement.
- \$12,000 from PG&E motor replacement.
- \$720,000 from the CEC for generator replacement.

### **Lessons Learned**

The plant manager at Vallejo found that the best way to implement conservation and efficiency projects was to have a high-ranking person(s) in the organization willing to continually investigate ways to conserve energy and look for programs that provide funds to defray the costs of the projects.