Water/Wastewater Case Study:

South Tahoe Public Utility District

Background

- Type of Agency: Wastewater
- Location: South Lake Tahoe, Calif.
- Population Served: More than18,000
- Water Connections: 14,000
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Summary

In 2001, South Tahoe Public Utility District (STPUD) initiated the Wastewater System Energy Evaluation to demonstrate how operational and process modifications could be made to lower the demand and energy costs for various facilities within the wastewater system. The evaluation highlighted several areas for improvement, including the dissolved oxygen (DO) system and pump efficiency. For its efforts, STPUD realized total energy cost savings of $198,975, and energy usage savings of 2,888,800 kW. Most of the projects were funded with help from California Energy Commission (CEC) and California Public Utilities Commission (CPUC) rebates and grants.

Referenced in Water/Wastewater Guides:

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

Plan

The CEC’s Energy Efficiency Division retained HDR Engineering Inc. to assist South Tahoe PUD in assessing specific areas with the greatest energy-savings potential. During the on-site investigation, HDR reviewed processes and equipment data, discussed operations with plant personnel and determined the energy consumption patterns and history of plant facilities. Specifically, HDR examined and analyzed the DO control system, filter influent pumps, plant effluent pumps, feasibility of installing variable frequency drives (VFDs) on the Al Tahoe lift station pumps and the Luther Pass pump station pumps. Plant personnel supplied data and answered questions related to plant operations. Consultants from HDR Engineering analyzed the data and prepared an Energy Assessment Report for the CEC.

The overall purpose of the energy evaluation was to demonstrate how operational and process modifications could be made to lower the demand and energy costs for various facilities within STPUD. More specifically, the goal was to reduce electrical energy consumed at the plant and to reduce SPPC billings. Unit energy consumption was twice that of most wastewater treatment facilities due to the high pumping costs associated with operating the effluent pump.

Seven energy conservation measures (ECMs) were identified for the existing facilities, six of which were considered feasible for implementation in the future. The ECMs included:

- Install automated DO control system,
- Limit peak discharge flows through flow equalization,
- Install a VFD on one plant effluent pump,
- Improve efficiency of plant effluent pumps,
- Install VFDs on filter influent pumps and replace one pump,
- Avoid running three pumps at luther pass, and
- Install VFD at a1 tahoe sewage lift station.

A cost analysis for each EMC was performed by using the rate schedule provided by Sierra Pacific Power Company (SPPC) to compare the projected demand and usage reductions to the existing operating conditions. The total capital costs for the recommended improvements were estimated at $211,000 with a payback period of 1.1 years.

Programs: Conservation

✓ **Water systems**:

- Optimized the Final pumps’ manual operation to avoid pump starts during peak hours.
- Allowed the old higher head pumps to come online only in order to pump to the emergency storage reservoir or to facilitate a backwash.

- Determined the optimum pump combinations by utilizing various pump combinations with the corresponding flow rates.
- Installed a new analyzer on the main aeration basin and a new PLC to control the blowers of the dissolved oxygen (DO) control system. Operators have the capability to provide a pre-programmed blower sequencing and/or throttling value position control schedule or allow the PLC to automatically control the blowers and valves based on the real-time DO residuals.

Programs: Efficiency

✓ **Water systems**: Replaced a secondary pump with a more efficient pump and a VFD.

Budget and Finance

All improvements were funded from the capital improvement budget. The Manager of Wastewater Operations prioritized the projects based on payback time and ease of implementation. Funding was easily justified by the rapid payback estimates in the Energy Assessment Report. South Tahoe PUD received several rebates and grants from both the CEC and PUC for the projects. The total cost of implemented projects was $200,400:

- Installed automated DO control system: Cost $16,000.
- Limited peak discharge through flow equalization: N/A.
- Improve efficiency of plant effluent pumps: N/A.
- Installation of VFDs and pump replacement: $136,900.
- Avoided running three pumps at Luther Pass: $10,000.
- Installed VFD at A1 Tahoe Sewage lift system: $37,500.

Results

South Tahoe PUD's energy conservation and efficiency programs in 2001 delivered annual energy savings of 12,710,700 kW and annual financial savings of $184,475. The estimated energy and cost savings for each program were as follows:

- Automated DO Control System:109,200 kW and $9,275.
- Limited peak discharge (not yet completed): 2,024,100 kW and $69,100.
- Improved efficiency of pumps (not yet completed): N/A.
- VFDs on pump and pump replacement: 498,600 kW and $33,100.
- Avoid running three pumps at Luther Pass: N/A and $68,300.
- VFD at A1 Tahoe Sewage lift system: 78,800 kW and $4,700.

In recognition of STPUD's success in reducing energy costs at its wastewater treatment plan, the CEC, in partnership with industry professional associations and electrical utilities, selected STPUD as a demonstration site for other plant managers under the Energy Efficiency Showcase project.