

Examples of Success

Efficiency Savings in California Water Supply and Wastewater Treatment Industries

Facility and Capacity	Efficiency Measures	Annual Energy Savings	Savings As a Percent of Total Electricity Costs
City of Willits Wastewater Treatment Plant <i>Capacity: 1.3 mgd</i>	<ul style="list-style-type: none"> ■ Install VFDs and controls ■ Replace one large pump with several smaller pumps 	\$15,000	14
Madera Valley Water Company <i>Capacity: 8.21 mgd</i>	<ul style="list-style-type: none"> ■ Install VFDs and controls ■ Replace existing motors with efficient motors ■ Retrofit pump bowl for efficiency 	\$19,000	15
San Juan Water District Sidney N. Peterson Water Treatment Plant <i>Capacity: 120 mgd</i>	<ul style="list-style-type: none"> ■ Replace eight existing motors with efficient motors ■ Install four VFDs ■ Reduce pumping and increase lighting efficiency 	\$68,400	17
Moulton Niguel Water District <i>Capacity: 48 mgd</i>	<ul style="list-style-type: none"> ■ Replace existing motors with efficient motors ■ Upgrade existing computer controls 	\$332,000	25
East Bay (Oakland) Municipal Utility Special District 1, Wastewater Treatment Plant <i>Capacity: 415 mgd</i>	<ul style="list-style-type: none"> ■ Install high efficiency pumps and motors with VFDs ■ Replace two small compressors at the pure oxygen plant with one large unit 	\$250,000	30
Encina Wastewater Authority <i>Capacity: 36 mgd</i>	<ul style="list-style-type: none"> ■ Upgrade aeration diffusers ■ Install high-efficiency motors and VFDs ■ Introduce demand control 	\$311,000	not available

For More Information:

Southern California Edison Representative: (800) 736-4777

U.S. Department of Energy, Office of Industrial Technologies provides software and other technical assistance on motor and pump system efficiency, including:

Pump System Assessment Tool (PSAT) The Pumping System Assessment Tool helps industrial users assess the efficiency of pumping system operations. PSAT uses achievable pump performance data from Hydraulic Institute standards and motor performance data from the MotorMaster+ database to calculate potential energy and associated cost savings. Available at: www.oit.doe.gov/bestpractices/motors/

Decision Tools for Industry CD The Decision Tools for Industry CD contains both the MotorMaster+ 3.0 (MM+ 3.0) and Pump System Assessment Tool software packages described above. In addition, it includes MM+ 3.0 training. Call the Clearinghouse at (800) 862-2086.

Adjustable Speed Drive Evaluation Methodology and Application Software (ASDMaster) This Windows software program helps the plant or operations professional determine the economic feasibility of an ASD application, predict how much electrical energy can be saved by using an ASD, and search a database of standard drives. For more information see the ASD Master web site: www.epri-peac.com/asdmaster/

Motor Decisions Matter is a national campaign encouraging the use of sound motor management and planning as a tool for cutting motor energy costs and increasing productivity. The campaign's web site, www.motorsmatter.org has a free Motor Planning Kit, which includes helpful tips to start a motor plan, links to pertinent on-line resources and general information about the campaign. For additional information call: (800) 862-2086.



Hydraulic Institute provides a number of services to its members and publishes many useful publications, including *A Guide to Energy Efficient Pumps and Pumping Systems* (HI, 2000). Contact information: Hydraulic Institute, 9 Sylvan Way, Parsippany, NJ 07054, (973) 267-9700, www.pumps.org

NEMA Premium™ is a national premium-efficiency electric motor program launched by the National Electrical Manufacturers Association in 2001. Ten motor manufacturers participate in the program and it is endorsed by the Consortium for Energy Efficiency (CEE). For more information call (703) 841-3274 or visit www.nema.org/premiummotors

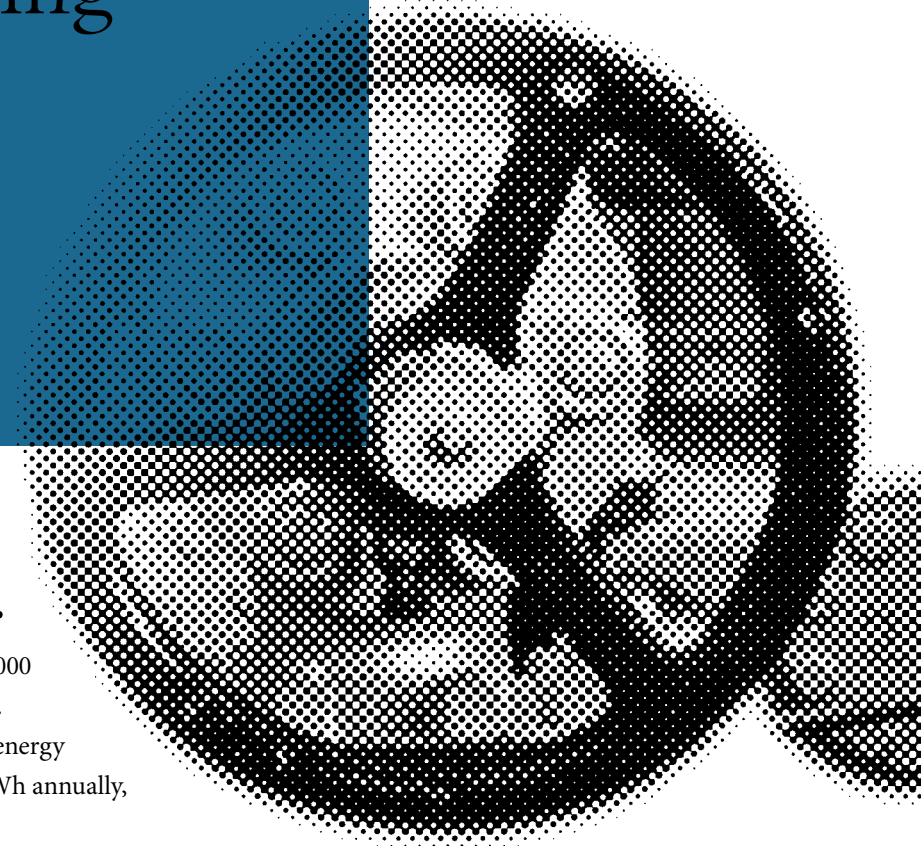
SAVING MONEY WITH MOTORS

in Water Pumping and Supply

Water Means Energy...

More than 60,000 water supply systems and 15,000 wastewater systems operate in the United States. These facilities are among the country's largest energy consumers, requiring an estimated 75 billion kWh annually, or 3 percent of annual U.S. electricity.

Electricity requirements in the water industry are expected to increase by 20 percent during the next 15 years as plants expand treatment capacity to meet population growth and additional treatments are applied to meet the Safe Drinking Water Act and the Clean Water Act. Emerging non-regulatory issues, such as improvement in drinking water taste and color, will also require more energy.



An Educational Publication for the Water Facility Management Industry brought to you by Southern California Edison



Especially In Southern California

In California, water supply and treatment means pumping large quantities of water long distances and over mountain ranges, treating and distributing it within the state's communities, and treating the resulting wastewater. This industry is the state's largest user of electricity.

Pump and compressor motors account for 80-90 percent of the electricity used in water supply and treatment. Therefore a significant opportunity exists for the managers of water utilities and treatment facilities to use less energy and save money by adopting more energy-efficient motor technologies and management practices. Capturing these cost-saving opportunities should be a management priority.

A number of industry factors are creating an ideal opportunity for managers to improve the energy efficiency of motor systems.

- Nearly 40 percent of drinking water systems with surface water sources have a need to build, rebuild or make significant improvements at their treatment facilities.

- Approximately 35 percent of capital in the water supply industry is spent to repair or replace equipment.
- Legislation regulating the safety and quality of drinking water is having a significant impact on capital expenditures.

Saving 20 to 50 Percent on Motor Systems

Potential energy savings in the water supply industry range from 20-50 percent. These efficiency measures exist at most water supply facilities, falling into three broad categories:

Operations: The following efficiency measures may be undertaken at little or no cost. Facilities personnel can perform monitoring and maintenance on equipment to increase system efficiency and prolong equipment life.

- Monitor and maintain equipment
- Check optimum ambient temperature and ventilation
- Measure system pressures, flow rates and elevations
- Review piping system design, including elevations for sizing
- Switch production to off-peak times

Components: These measures involve replacing standard motors with their energy-efficient counterparts. The motors most widely used in the industry are 1800 rpm, vertical hollow shaft motors that are 250hp or less in size. The National Electrical Manufacturers Association (NEMA) and Consortium for Energy Efficiency (CEE) jointly developed the NEMA Premium™ specifications, an industry-wide definition of premium efficiency.

In addition to using less energy and saving money, NEMA Premium™ efficiency motors have...

- Cooler running temperatures
- Longer insulation life
- Longer bearing life
- Less vibration
- More tolerance of phase imbalances and overload conditions

Systems: All of these efficiency measures can be approached in concert by employing a "systems approach" to motor efficiency. Rather than considering motor efficiency in isolation, the entire motor operating system should be considered when implementing efficiency measures.

Specific recommendations include...

- Designing and selecting appropriate motor systems
- Matching motor system to loads
- Using Variable Frequency Drives (VFD) instead of throttle valves
- Reviewing system requirements

The Bottom Line

The combination of legislative and regulatory mandates along with the availability of technologies that improve motor system efficiency creates an unprecedented opportunity for managers to improve the productivity of water and wastewater systems.

Call your Southern California Edison account representative today for details on how you can get started today.

Ask about:

- Purchasing NEMA Premium™ efficiency motors
- Developing a written set of criteria for all your repair/replace decisions
- Listing motor inventory (including spares)
- Making repair/replace decisions for your motors, especially those in critical applications.
- Tuning up motor systems.

**NEMA
Premium**

Efficient Motors Pay for Themselves

An energy-efficient 25hp, 1800-rpm, totally enclosed, fan-cooled 460-volt motor that runs 16 hours per day at 75 percent load will save \$600 per year over a standard efficiency motor at an electrical rate of 10 cents/kWh. With a cost premium of \$378, simple payback is less than 8 months.

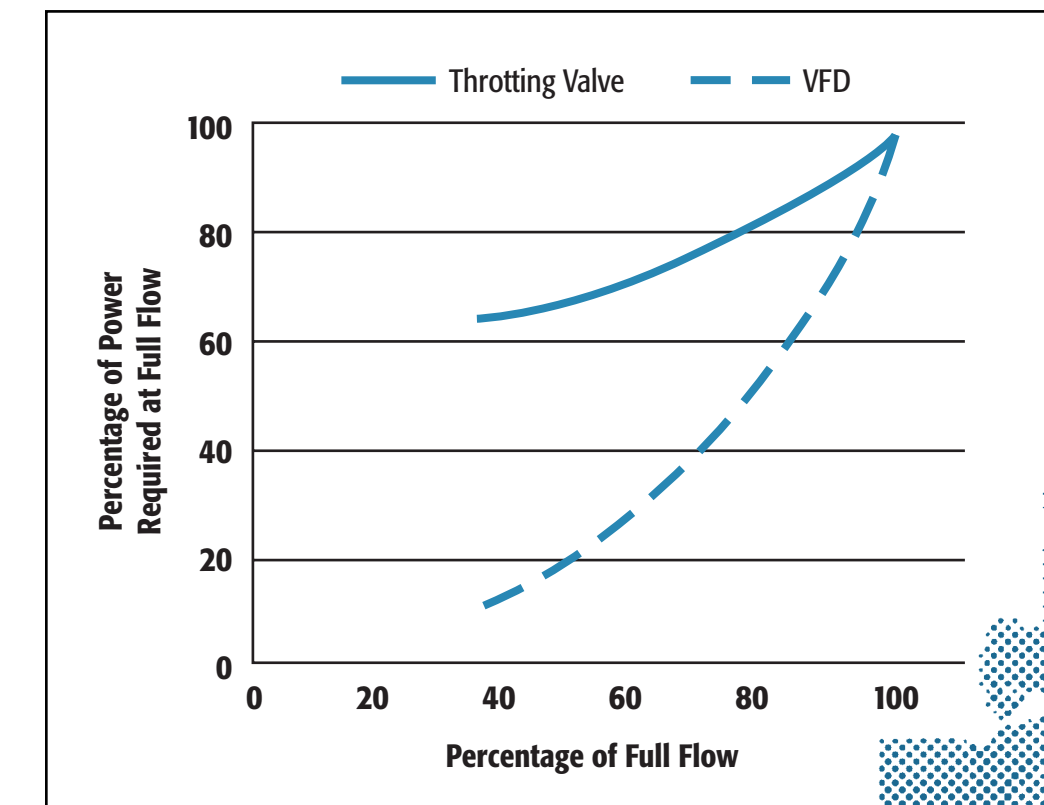
Source: CEC, 1997

VFDs Can Reduce Energy Costs 45 Percent

An analysis of system efficiency may reveal opportunities to install variable frequency drives (VFDs). A VFD is an electronic control device that modulates the amount of power being delivered to a motor to allow for continuous matching of motor speed to the demands of varying flow. VFDs are commonly used to increase motor efficiency in water supply facilities. These devices accommodate fluctuating demand by running pumps at lower speeds and requiring less energy while more accurately meeting pumping needs. They are efficient alternatives to standard throttling valves (see chart) and cause far less stress and damage to mechanical equipment.

With a 25hp motor running 23 hours per day (2 hours at 100 percent speed; 8 hours at 75 percent; 8 hours at 67 percent; 5 hours at 50 percent, which is typical of the water supply industry) a VFD can reduce energy use by 45 percent. At 10 cents/ kWh, this results in an annual savings of \$5,374. Source: CEC, 1999

Energy Consumption of VFDs and Throttling Valves



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