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TYPE MF-63E DATE 1991

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Energy Audits May Offer Cost Savings to Utilities

by **Natalie Eddy**
NESC Staff Writer

Large water and wastewater treatment plants can save 10 to 20 percent of their total energy costs through a conservation study. Although the cost of a professional energy audit may be prohibitive to smaller facilities, experts say smaller plants don't have to be left out in the cold.

One option may be to enlist technical assistance from your electric company. Some electric utilities offer technical assistance to water and wastewater plant operators and will hire a professional energy auditor or share in the cost of an audit. Also, some energy auditing firms offer group rates to smaller facilities.

Failing that, however, there are steps operators can take on their own, according to Ray Ehrhard, deputy director of the Electric Power Research Institute's (EPRI) municipal water and wastewater program, a research arm of electric utilities. "Generally, for smaller facilities, the best bang for the buck is making management controls without spending money. Things like making sure you're on the right electric rate schedule, shifting loads to off peak periods, looking for unnecessary equipment that's running, a variety of things like that." Ehrhard added that he has seen plants save as much as 50 percent by instituting these changes.

Pumps Are Paramount

Peter Barrer, PE, and Sharon Jones, project manager, both of Demand Management Institute (DMI) in Newton, Massachusetts, said one of the most important things a small facility can do to save money is to confirm that their pumps are in adjustment and working at their design efficiency level.

"If there's a single thing any facility should do it is to confirm their pumps are in adjustment," said Barrer. "It is often necessary to adjust the pump to obtain the original efficiency level. We often recommend that pumps get adjusted. It's easy for them to get out of adjustment over time, through wearing of the rings."

He suggested comparing the pump's performance to its original expectation by using a flow meter, pressure gauges, and a power measurement.

Jones suggested that pumps be tested annually to see if they are working at their targeted efficiency level. "It can be a tremendous opportunity for cost savings," she said. "Every pump has a manufacturer's performance curve that says at this pressure you should get this much flow, but be sure to use calibrated pressure gauges to get accurate readings."

"We had a case recently working with a plant where their motors were 200 to 300 horsepower. We checked the performance and just with an adjustment, which a maintenance guy was able to do in one day, we saved them \$20,000 per year. That plant had been running like that for 10 years. It made it easy for them to pay our bill," she added.

Most smaller utilities will have only one pump. Barrer said if there is more than one pump, it is important to choose a pump that best matches the flow at any given time of day.



Jones noted that in many cases, pumps are oversized for a facility. “Many times when plants are built, they look at expectant population growth,” she said. “Very often we will find a pumping station with two to five pumps that only runs one pump.”

She added that sometimes it is worthwhile for facilities to buy a smaller pump just to handle night flows. “Sometimes after a system is built and you see what levels you’re running at you can put in a smaller pump to match the flow more efficiently,” she said.

Timing Matters

Jones noted that DMI has done a large amount of work with water and wastewater plants. “For one water supply utility we saw that they were normally running their pumps 24 hours per day, making as few flow changes as possible,” she recounted. “Their electric company charged almost twice as much for electricity used during the day as for that used at night. We showed them that it would be to their advantage to fill their storage tanks at night and allow their water levels to fall to the lowest comfortable level during the day.”

Barrer said some plants are installing variable speed drives in hopes of saving energy. He cautioned, however, that while they may be convenient, in many cases, will not save energy. “They are being sold for energy efficiency, particularly on water supply plants,” he said. “They’re very nice for operation. They don’t bang the pumps starting and stopping, but we often find that they don’t save energy.”

However, Jones said if you already have a speed drive, it is usually to your advantage to use it to match the flow to the demand. “You will seldom recover the cost of putting the drive in compared to running on/off; but if you already have one, you can match your flow to the demand to keep a lower level in your storage tank,” she explained.

“The power that you have to put into your pump is a function of flow and pressure. That pressure is set by the level of water in your storage tank so if you can lower that level, that’s less power to put into that pump. There’s always an advantage in maintaining the lowest level you’re comfortable with.”

Other Tips To Consider

Jones said another cost-saving tip is to analyze relative efficiency of water sources. “The cost of providing water can be very different,” she said. “We had a case where a water supply plant had two sources—one source was the river supply, the other was a mountain stream. You have to look at how much power has to be put into each.

“There’s a huge benefit to using the water that is from the mountain stream. The river water had to be pumped and treated. The mountain water was already at a high elevation so it required very little energy. They saved a tremendous amount of money by making a simple change.”

Jones said some utilities base their yearly rates on the highest demand period charges, called ratchet charges. She suggested that in water supply systems it might be cost efficient to turn off one supply pump when operating a backwash pump so you can lower the demand peak and avoid these charges.

To help operators remember what time of day pumps should be running, she said it is helpful to make a clock face. “You should read the rate schedule and associated charges to find out when electricity costs more in your area,” she said. “Then, make up a clock face with 24 hours on it. Put peak demand periods in red to remind operators. It’s a simple thing, but it works.”

Barrer added that another cost-saving tip for smaller utilities is to use premium efficient motors when replacing a motor. “This can make a difference of two to three percent of a utility’s total energy cost,” he said, adding that it is only cost efficient if the motor already needs to be replaced.

Ehrhard suggested that operators “look at their equipment. Can they have more efficient equipment or operate it differently?” He added, “The best thing to do is to appoint an energy champion in the plant. Usually things are overlooked unless someone takes that role. We have seen some real results with this method. It can be a maintenance guy, plant operator, or anybody.”

“It helps to have information on energy usage that’s readily available and easy to track.

Many times the electric utility can help with that by putting a meter on the plant to track what their usage is. The energy champ might say, ‘I’m noticing at these two hours during the day, we’re at peak rate, we need to do these things to eliminate it.’ Then, he can make the necessary changes.”

To learn more about the Electric Power Research Institute, visit their Web site at www.epri.com. Information about the Demand Management Institute may be found at www.dmiinc.com.



Natalie Eddy, who now teaches in the journalism program at West Virginia University, was previously a writer for the National Environmental Services Center.



This article originally appeared in the Winter 1999 issue of *Water Sense*. Published by the National Drinking Water Clearinghouse between 1995 and 2000, *Water Sense* covered financial and management topics for small community water systems. Copies of the newsletter may be found on the National Environmental Services Center Web site at www.nesc.wvu.edu/ndwc/ndwc_watersense.htm.