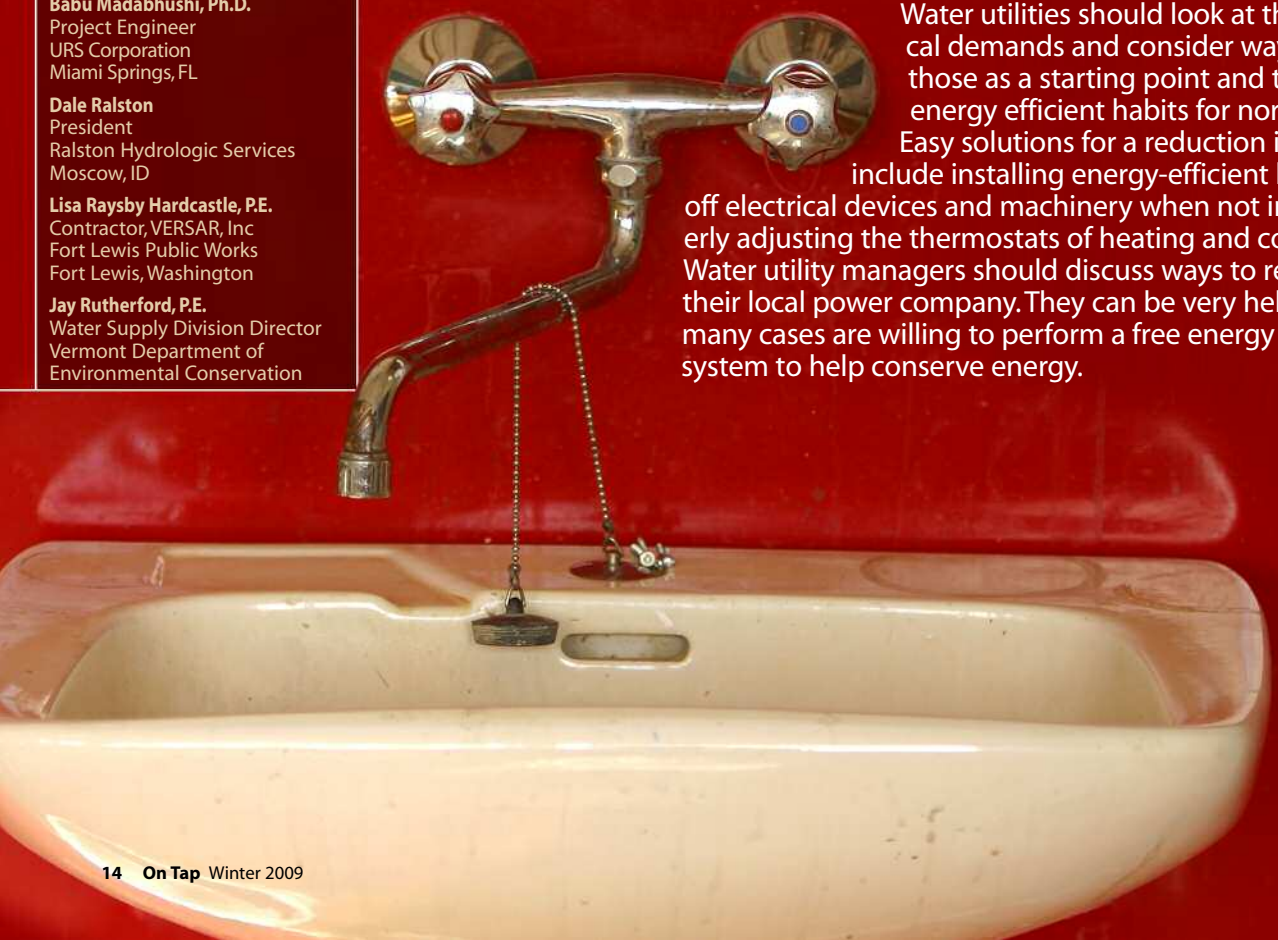
Each issue, we ask members of the *On Tap* Editorial Advisory Board to answer a drinking water-related question. We then print as many responses as space permits. The opinions expressed are not necessarily those of NESC.

Q: Be it the price of gas at the pump or the cost for heat and power, energy costs are on everyone's mind these days. What are some simple ways that water utilities can save money on energy?

Keep an Eye on those Pumps

As we've discovered in recent years, the cost of energy can fluctuate rapidly, and we can expect that to continue. Energy-saving practices are especially beneficial in the operation of larger water utilities. Systems can conserve a lot of energy (and also money) of they are careful about the number of large pumps they run at the same time in each month's billing cycle. This is because the amount of electricity billed for is based on the highest "demand" that occurred during the month.

Higher electrical demands mean that the entire monthly energy usage is multiplied by a much larger number. The overall energy cost can increase exponentially. For example, the cost of running three 400-horsepower pumps at the same time is a lot more than just running one pump for three times as long. A good operator will consider water demands and reservoir fill rates and try to run fewer pumps for longer periods of time to conserve energy (and minimize wear and tear on the system, too).



Water utilities should look at their peak electrical demands and consider ways to reduce those as a starting point and then adopt energy efficient habits for normal operations. Easy solutions for a reduction in energy use include installing energy-efficient lighting, turning off electrical devices and machinery when not in use, and properly adjusting the thermostats of heating and cooling systems. Water utility managers should discuss ways to reduce costs with their local power company. They can be very helpful and in many cases are willing to perform a free energy audit of your system to help conserve energy.

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Examine All Areas to Achieve Savings

Four areas where water utilities can save energy costs are: (1) vehicles, (2) buildings, (3) pumps, and (4) by performing water audits.

For vehicles used by water operators and meter readers, consider replacing older vehicles with more gas-efficient models, plan more efficient drive routes, and possibly switch from monthly to bi-monthly customer meter reading if you know you have a reliable system with few problems and leaks.

Buildings, especially pump houses in northern, colder regions, should be better insulated. Many pump houses in western Washington have been built with exposed insulation. The insulation gets infested and must be removed. Enclosing walls with plywood or insulating foamboard can be used in lieu of trying to heat a vented space continuously. Install energy efficient motion lights for security purposes instead of leaving the lights on 24/7.

The largest energy savings can probably be achieved in the pumping system. A poorly engineered pump system, as well as poorly maintained ones, can cause pumps to cycle too frequently. Leaky check valves, undersized or air-entrapped hydropneumatic tanks, or pump on and off signals set too closely can all cause pumps to cycle more frequently. Instead of constant speed pumps, commonly used in smaller water utility operations, variable frequency drive (VFD) pumps could be installed. VFD pumps can save energy two ways: (1) by reducing initial electric load to start the pump (of course this would be for electric utilities that charge a demand fee and for larger pump applications with or without soft starts) and (2) slowing down the speed of the pump during low demand periods reduces the total energy consumption of the pump. An added benefit for customers is to maintain the distribution system pressure over a narrow band. Another added benefit to a water utility is less space is used in a pump house and/or less operational storage is needed for pump protection (depending if pressure or gravity storage is used).

Finally, if the water utility has high unaccounted-for water loss, they might want to consider conducting a more thorough water audit of their operations, including a leak detection study. Hydrants are notorious for unaccounted-for water use (both in leaks and unauthorized usage). Utilities can re-evaluate their hydrant-flushing program to determine if the flushing strategy can be improved without degrading their customers' water quality. Check tank overflows because some storage tank designs make it difficult to see overflows (e.g., discharge pipe is underground and not visible on tank site). The utility might need to add better tank level controls or a SCADA system to limit tank overflows. Also, if customer meters are under reading, then the customer may not be paying for what they are using and the utility is pumping, conveying, and treating.

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An Energy Audit Will Pay

Operation of water and wastewater systems is normally a power intensive process, frequently requiring large electric motors for pumping, mixing, and other elements of the treatment and distribution functions. In this era of rapidly increasing energy costs, minimizing this power consumption assumes significant importance both in terms of energy conservation and monetary savings. An energy audit is one way to see where a utility can save money.

As reported in the National Rural Water Association paper "Small System Electric Power Use: Opportunities For Savings," a pilot study in New York produced significant results. With only nine systems examined, the project officer was able to state:

- A lot more operators of water systems than I would have ever imagined had never seen an electric bill until we needed them to collect the data.
- At one of those systems, we were able to discover a meter located on an abandoned storage tank. This meter was generating a bill for $39.00 a month for over 10 years. This added up to more than $5,000 thrown away and would have continued if not for the survey.
- At another system, I was able to show the operator that he was paying less than $20 to produce that month's water supply and more than $225 that same month to heat a separate building that the water passed through before entering the distribution system. A simple heat tape was installed and the heat turned off [in the building] since they didn't use it for anything else anyway.
- When a system with multiple wells saw the more than $2.00 per 1,000 gallons cost incurred at one well site, they decided to only use it in emergencies.
- At yet another system, I found a meter with a three-phase service left over from a well pump application that today serves a single 100-watt light bulb in that building.
- Bills are often estimated, and these amounts are usually higher than the actual usage. Estimates can be minimized by making electric meters accessible, especially in bad weather.

Even seemingly small changes can produce significant savings for small community water and wastewater systems.