Saving Water Counts in Energy Efficiency

Hospitals interested in reducing energy waste can find opportunities in a most unlikely place – water efficiency. Every drop of warm or hot water wasted is billed three times - once for incoming fresh water; a second time for sewer charges, which will be more costly since wastewater requires more treatment than fresh water; and finally a third time for the energy to heat the water. Increasing water efficiency then will give you triple savings across two utilities, but there are larger benefits as well. Healthcare systems are typically among the top water users in their communities. Saving water reduces the cost of new wells, pumping systems, and water towers in addition to lessening the strain on water systems during a dry spell. And if your hospital is in a dry climate, the value of water efficiency is even greater.

Currently, about 8 percent of U.S. energy demand is used to treat, pump, and heat water. With increasing energy prices, as well as rising water and sewer rates, there is a large and growing opportunity for hospitals to reduce their operating costs and environmental impact through efficiency programs that include water management.

How much water does a typical hospital use? A 1996 study by the Massachusetts Water Resources Authority found that hospitals in the Boston region use anywhere from 40 to 350 gallons per capita each day. While the water consumption among the urban and rural hospitals was dependent upon factors like services provided, inpatient/outpatient visits, equipment used, age of facility, and other factors, this large range indicates that some hospitals are using water more efficiently than others. In fact, Boston area facilities were found to have, on average, a potential for reducing about 20 percent of their water use, cost-effectively. With the water and sewer costs of these facilities averaging over 20 percent of total utility costs, the more efficient hospitals can deliver patient care at lower cost.

The ENERGY STAR Guidelines for Strategic Energy Management, a product of identifying best practices from partners over 12 years, is a good place to start when planning resource management in your hospital. Just as with energy, the first step to superior water management is to understand how much water your hospital is using today, where the major uses occur, and where you can achieve efficiencies with the best return on your efforts. As with any successful management strategy, a water efficiency program needs to include a coordinated and sustained approach by management to optimize the returns on staff efforts and investments.

With an understanding of where, and how, your hospital is using water, you are poised to make improvements that will save water, energy, and money. Just as you do in tracking energy use, look for the major consumption patterns, spikes, and higher or lower than expected consumption in specific areas, if data from submeters is available. Before investing in major upgrades, take advantage of the low-cost opportunities to increase efficiency. Review maintenance procedures to ensure that leaks are found and repaired as they occur.

Ensure janitorial staff shut off all faucets and report leaks immediately. These seemingly small measures can have big returns, especially if staff understands the value of their efforts.

In a typical hospital, total water use can be broken down into five major categories: sanitary, HVAC, medical processes, cafeteria/food service, and laundry. See accompanying graph for the average percentage of total water use allocated among each of the categories. Below are examples of some of the actions that hospitals might include to increase water and energy efficiency in each of these areas. These are not meant to encompass all the cost-effective options available. For example, landscape irrigation can be a significant source of water use, depending on where the hospital is located, and should be included in a water management plan.

Sanitary

In addition to implementing maintenance procedures, such as checking for and repairing leaks, consider replacing older showerheads and faucets with lower-flow equipment. Low flow faucet aerators save approximately one gallon of water per person per day, while low flow showerheads can save about 4 gallons of water per person per day. Consider the range of efficient toilets available as well. Your water utility may offer incentives for replacing older equipment with more efficient fixtures.

The US Federal Energy Management Program found that the Veterans Affairs hospital in Portland, Oregon could save about $17,000 per year by using low flow faucets and showerheads, with a payback of less than one year.

HVAC

Examples of low cost operational and maintenance options for heating and cooling systems include adjusting blowdown rates of the boiler and cooling tower (per manufacturer specifications) and checking and repairing steam traps. Other options to consider where appropriate include upgrading pumps and compressors to take advantage of air cooling, installing a dedicated water chiller to serve the radiation and MRI units, and returning steam condensate to the boiler for reuse.

Facility engineers at Norwood Hospital in Massachusetts reduced the amount of water that was bled from the cooling tower by increasing the concentration ratio from 4 cycles to 12, saving roughly 600,000 gallons per year. The annual savings is $3,900, with an immediate payback since all that was required was to re-adjust the set point on the bleed off controller.

Medical Equipment

Look into options that reduce the amount of water and energy used for medical equipment without compromising performance. Single-pass or once through cooling systems are a very expensive way to cool equipment such as X-ray machines, CAT scanners, medical vacuum pumps, and air compressors. Consider adding a closed loop cooling system with the units placed on a process loop that is connected to the existing cooling tower or a secondary cooling system such as a heat pump. Another option is to install automatic valves on film processing or package systems on X-ray equipment to stop water flow when equipment is not in use. More generally, whenever you are purchasing or upgrading medical equipment, be sure to include an evaluation of the water and energy efficiency of the available options.

In 2003, the University of Washington, Facilities Service Department, retrofitted 50 sterilizers and autoclaves with water-saving kits in their laboratory facilities. The kits eliminate water tempering during non-sterilizing machine cycles, which is necessary before draining hot water into local drains. It is estimated that the University will save 2.6 million gallons of water per year, equating to $250,000 in avoided water and sewer costs.

Cafeteria / Food Service

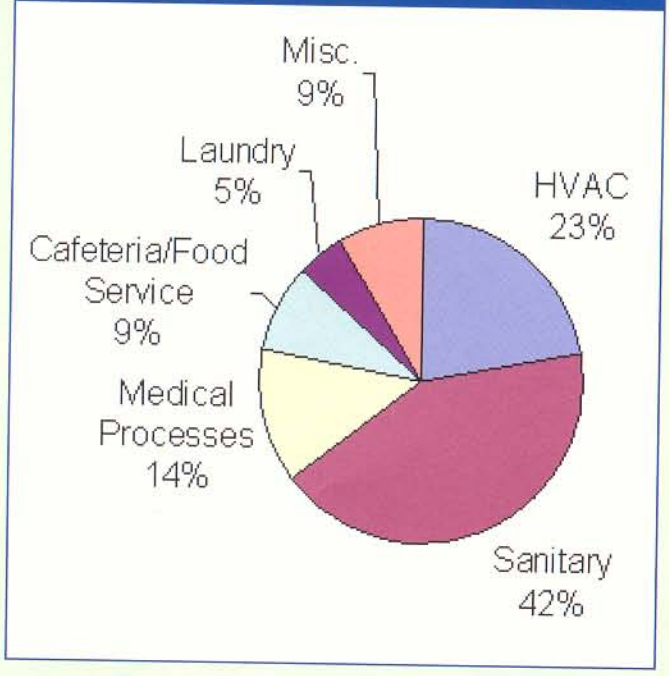
In the hospital kitchen, look for the ENERGY STAR label when purchasing new steam cookers, combination ovens, or walk-in refrigerators. For a list of models, savings calculators, and procurement guidance for these and other types of ENERGY STAR qualified commercial equipment, visit www.energystar.gov/healthcare.

Qualifying steam cookers consume approximately 2 gallons of water per hour, compared to 25 to 35 gallons on standard models. Currently, 34 different models of ENERGY STAR qualified commercial steam cookers are on the market. They are 60% more energy efficient than standard models, owing to a combination of lower cook times, greater cabinet insulation, lower idle energy rates, and more efficient steam delivery mechanisms.

Combination ovens offer multiple cooking modes, including dry heat, moist heat, and steam. A typical 10-pan boiler style combination oven can consume 30 – 40 gallons per hour while operating, or about 175,000 gallons per year under heavy use. ENERGY STAR qualified models generate humidity by spraying a fine mist of water on the heat exchangers at regular intervals. This design consumes 10 – 15 gallons per hour at the highest humidity level, saving 110,000 gallons per year over a boiler-style combination oven.

Other water and energy-saving kitchen equipment include pre-rinse spray valves, high efficiency commercial dishwashing machines, and food scrappers, which reduce the need for garbage grinders. Pre-rinse spray valves, used to rinse food particles off dirty dishes before placing the dishes in a washing machine, are

FIGURE 1
Average Water Use by Category of Facilities Studied



Source: Massachusetts Water Resources Authority, 1996

Facilities studied include hospitals with 138 – 550 bed capacities, in-patient admissions of 5,100 to 11,600 per year and annual water use ranging from 15 – 67.2 million gallons. The seven hospitals studied included: 1 large Boston, 1 large long-term care, 4 small community, and 1 regional urban.

designed to spray water between 2.5 and 5.0 gallons per minute (gpm). Low flow units use 1.6 gpm or less. If your dish washer is pre-rinsing dishes for 3 hours a day, and you replace your 2.6 gpm valve with a 1.6 gpm valve, your daily water consumption will drop from about 470 gallons/day to 290 gallons/day, saving about 66,000 gallons of water per year. Depending on your type of hot water heater and utility rates, you could save as much on your energy bill as you will on your water bill.

Don't Drain Your Profits

The hidden value of water conservation is energy conservation. Both will have a significant impact on your bottom line, helping to reduce your institution's water, sewer, and energy bills, and chemical and maintenance costs. With value like that, every drop is a liquid asset worth more than its weight, many times over. ASHE

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