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Using and disposing of water more efficiently

Building owners and managers need to know that water issues must be addressed.

▶ Facilities around North America — and, in fact, throughout much of the world — are under growing pressure to incorporate water-reducing strategies into their daily operations. One reason for this is the realization that the costs of water, water treatment and water infrastructure are only going in one direction: Up.

A second reason for this trend is that predictions of water shortages in the next 15 to 20 years — again, both in North America and around the world — are now being voiced by a growing chorus of respected water experts. In fact, in some of the fast growing emerging economies such as China — where electrical brownouts that curtail energy to residential properties to make it available for businesses and industry are common — it is predicted that temporary water curtailments may soon be required during peak water use periods.

Finally, there are also growing concerns about the disposal and treatment of the wastewater that is released by large commercial and industrial facilities. Wastewater typically contains nitrogen and phosphorus, and excess amounts of these contaminants are degrading many of our coastal and inland waters. These pollutants can cause excess algae growth and disastrous ecological impacts in our waterways, leading to what is sometimes termed “dead waters.” Dead water areas have low oxygen levels that can impact aquatic life reproduction and cause death among aquatic animals.

In order to address these challenges, as well as to reduce water consumption and help improve the treatment of wastewater, building owners and managers can implement measures suggested by the U.S. Green Building Council’s LEED certification program.

The LEED program, or Leadership in Energy and Environmental Design, allows building owners/managers to earn points in order to achieve LEED certification. Facilities earn these points by taking steps to reduce their overall environmental footprint. LEED-certified buildings are typically considered to be both healthier for users and more cost effective. Under the LEED rating system, a facility can earn up to five points by making significant reductions in water use and wastewater creation.

Even if a facility is not seeking LEED certification, these measures can be used as a guide to help determine what steps should be taken and what areas need to be addressed. These measures include three important credit areas:

1. Wastewater treatment
2. Landscaping
3. Water usage efficiency, specifically in restrooms.



LEED-certified buildings, such as the one picture here, outperform older facilities in the area of water conservation.

Wastewater treatment

The removal of nitrogen and phosphorus (and other impurities) from a facility’s wastewater can both earn a facility one LEED point and also help local treatment facilities protect regional waterways. Taking this step is an important indication that a facility is both socially and environmentally responsible. As referenced earlier, the release of excessive amounts of nitrogen and phosphorus can have disastrous impacts on aquatic ecosystems. Nitrogen, for example, has been identified as a key cause of the decline of shellfish in the Chesapeake Bay.

The presence of large amounts of phosphorus in a body of water can result in what is known as eutrophication. This is the process in which a body of water experiences excessive algae growth due to the presence of high levels of nutrients. As these algae die and decompose, the high levels of organic matter they leave behind deplete the water of available oxygen, causing the death of aquatic organisms such as fish.

Fortunately, new and innovative technologies have been developed to help facilities address wastewater challenges, effectively removing or significantly reducing the amount of nitrogen and phosphorus released. Tests of a variety of these new wastewater technologies, some funded by the U.S. Environmental Protection Agency (EPA), suggest that there are a number of cost effective systems available for effective

tively removing significant amounts of nitrogen and phosphorus from wastewater. Further, many of these systems require few ongoing operational needs and have low maintenance costs.

Landscaping

Many building owners/managers are startled to learn just how much water their facilities use for landscaping. For example, when the Las Vegas MGM Grand Hotel opened in 1993, 85 percent of the building's acreage was covered with lawns and flowering plants. The amount of water needed to maintain this landscaping — 60 gallons of water per square foot per year — was huge, especially taking into account the fact that Las Vegas is located in one of the driest areas of the country and suffers chronic concerns about droughts.

To address the problem, the facility converted to xeriscaping, a step that can be undertaken by any facility in any part of the country. Xeriscaping is a term first coined by the Denver Water Department to describe landscaping that makes water conservation a major objective. The word comes from the Greek word "xeros," meaning dry.

Xeriscaping has several components. Careful, detailed planning is a must. For example, planting on the southern and western exposures of a property generally results in greater water loss. With careful planning, water can be saved in these areas by selecting less water-hungry plants. In fact, selecting vegetation that either requires little water to maintain or is native to the area is key to xeriscaping.

In addition to plant selection, making the transition to xeriscaping generally involves examining such issues as:

- The slope or grade of the property. Terracing may be necessary to help save water and slow runoff.
- Proper soil preparation. Selecting soil that helps support healthy plant life and has a balance of soil clusters, sand and pore spaces optimizes water usage.
- Proper irrigation. Property managers should conduct a water usage audit that ensures that sprinkler systems effectively irrigate their plants without wasting water by allowing it to fall on parking lots, walkways, etc.

The results of xeriscaping proved quite beneficial for the Las Vegas MGM Grand Hotel referenced above. Follow-up water audits revealed that the hotel grounds now consume only about 20 gallons of water per square foot per year, approximately a two-thirds reduction in water use.

Indoor water usage efficiency

After landscaping, in most cases, more water is used in restrooms than in any other part of a facility. This was first addressed nearly 20 years ago when the U.S. Congress passed a number of regulations requiring faucets, toilets, showerheads and urinals to use less water. Although these regulations are still in effect, in recent years new technologies have been developed that far exceed these water reduction requirements in many cases. For example:

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- **Faucets:** Reducing the flow rate of faucets and showerheads is actually rather easy. As with other water-use reducing fixtures, these systems have improved significantly in recent years, allowing a simple aerator to limit the amount of water released. Very often, users cannot even tell the difference between an older, water-hungry faucet/showerhead system and those that make use of the new aerator technologies.

Studies have also found that sensor-controlled faucets help conserve water in many cases. These kinds of fixtures first became popular due to the fact that most people just don't like to touch anything in a public restroom, as well as because of increased concerns about cross contamination. The water released by sensor-controlled faucets can be adjusted, reducing the amount of water used. These systems are also designed to stop water flow as

soon as a user's hands have been removed, preventing waste. Because today's sensor-controlled systems are far more dependable than earlier models, these options should now be strongly considered in any building or remodeling program.

- **Toilets:** Today's toilets cannot legally use more than 1.6 gallons per flush (gpf). But systems are currently available that use as little as 1.29 gpf while also flushing efficiently with only one flush. Another option that is becoming increasingly popular is dual-flush toilets. These systems use 1.6 gpf or less to remove solid waste and about .8 gallons to remove liquid waste. The handle or buttons on these toilets allow users to decide which type of flush is needed. A study by Purdue University from June 2004 to June 2005 found that there is a 45 percent reduction in water use when these systems are installed.

Taking things a step further, air-compressed toilets — similar to those used on

airplanes — are also growing in popularity in areas of the country where water problems are chronic. A perfect example is again in Las Vegas. Many of Las Vegas' large hotels have installed these systems, which use a combination of compressed air and water to quickly and effectively remove waste from toilet bowls.

- **Urinals:** Although there are urinals that use less water than currently mandated, the most important advance in water-conserving urinals are those systems that use no water at all. First introduced in the United States in 1991, waterless urinal systems allow urine to flow into and under a trap insert, also referred to as a cylinder or cartridge, which is designed to prevent sewer vapors from being released into the restroom. The urine then flows down a central tube and into the kind of conventional drain system commonly used by old-fashioned urinals. Although the savings can vary, a generally accepted estimate is that one waterless urinal can save about 40,000 gallons of water per year.

Many experts believe water issues will be even more pressing than energy challenges in the years to come. However, when it comes to water efficiency, we are fortunate to have systems and technologies that can significantly reduce both water use and the level of impurities found in wastewater, helping to ease the burden on local treatment centers and protect waterways. The next crucial step is simply greater public awareness. Building owners and managers need to know that water issues must and can be addressed, and that making these changes can also result in considerable cost savings. **WT**

A frequent speaker and author on water conservation issues, Klaus Reichardt is the founder and CEO of Waterless Co. Inc., located in Vista, Calif. Reichardt founded the company in 1991 with the goal of establishing a new market segment in the plumbing fixture industry with water conservation in mind. He also invented the company's key product, the Waterless No-Flush Urinal, which works completely without water. Reichardt has been a member of the U.S. Green Building Council since 1999 and is also a member of the University of California (Santa Barbara) EcoEntrepreneur Advisory Board. He can be reached at Klaus@waterless.com.

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