BY WINSTON HUFF, CPD, LEED AP

Water Efficiency and Code Changes

Improving water efficiency in buildings is forcing code officials and regulators to take a new look at the plumbing codes. The U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) sustainable building rating system is constantly raising the bar for efficient buildings. Current and future LEED credits are pushing the limits of regulatory standards and, in some cases, are requiring regulatory officials to consider new standards. What are some of the codes issues that could compel plumbing engineers to ask code review and code variance boards for revisions?

FIRST, A FEW EXAMPLES

A few years ago, one of my clients asked me to help them conduct extensive research on waterless urinals. They knew that the technology had been operating safely and efficiently for many years and wanted to know if the fixture would work for their needs. After extensive trials, they found the models that worked best. We then started the long march through the regulatory agencies to allow them to be installed.

Around the same time, I was working on a hospital project in a growing community whose residents wanted to include sustainable elements in the city planning. The problem was that old codes were in effect, and no one knew how to update them. For this project, the city and client did not want a large big-box store type of parking lot in front of the hospital. The client and the city worked with the landscape architect, civil engineer, and architect to develop a plan to update the codes to allow a green site that used bioswales and plants to treat water from the parking lots. The end result was a building with a green parking lot rather than a sterile black parking lot, which is a model for other developments in the city.

WHAT ARE SOME OF THE CODES THAT MAY REQUIRE CHANGING?

The New York Chapter of the USGBC is looking at some of the codes that may need to change to take water efficiency to a new level in the city. In this article, I'll look at some of these codes and how plumbing engineers can offer alternatives.

The goals for code changes are wide ranging and include increasing water efficiency, reducing demands on infrastructure, reducing infrastructure-based energy consumption, providing greater potable water security by reducing water use demand, and reducing the demand on combined storm water and waste systems.

METERS

In some cities, a building's water usage is not metered to the building. The cost of water distribution systems is part of the tax system. As a result, end users have little motivation to reduce water use.

However, a relatively low-cost technology along with a monitoring procedure is an effective way to reduce water usage. European cities such as London and American cities such as New York have reduced water usage dramatically with the installation of water meters.

The first step is for municipal water suppliers to meter buildings or customers so each customer pays for the amount of water they use. New York reduced average water usage per capita from more than 200 gallons per person to 130 gallons of water per person in less than 15 years with the implementation of a water meter program and a low-flow plumbing fixture program.

Submeters

Once the facility is metered, the next step is to meter water demands in a facility. This usually is the responsibility of the plumbing engineer. In areas where municipal water suppliers include sewer treatment rates on the water bill, it is common practice to meter water in a building that does not go into the sewer system. These systems include irrigation and sometimes cooling towers.

Some regions are considering a code requirement to install meters on makeup water supplies to boilers, evaporative cooling towers, food service, and laundries. In most cases, this is installed in medium to large buildings and not small commercial or single-family facilities. Along with the meter is the requirement for an alarm to sound at a predetermined amount of flow to alert building operators when an open valve allows gallons of water to flow into a storage tank or cooling tower.

Many municipalities are installing meters that can be remotely monitored. Systems can be set up to e-mail or call customers when flows are unusually high. For example, in my house, we noticed a water closet valve sticking. The day I repaired the fixture, our water supplier notified me of an unusually high use of water. These types of systems can improve relationships with clients and reduce water usage.

This same type of system is available for facility submeters. Building owners can learn ahead of time of unusually high flows in the building. Newer projects trying to attain LEED certification will find submetering required for some process water applications. The LEED for Healthcare rating system also will require submetering.

PLUMBING FIXTURES

Many people advocate revising plumbing codes to require plumbing fixtures in new buildings or major renovations to meet water fixture standards such as WaterSense.

For example, the standards would be as follows:

- Lavatory, public: 1.5 gallons per minute (gpm)
- Lavatory, public metering: 0.25 gpm per cycle
- Lavatory, public other than metering: 0.5 gpm
- Showerhead: 2.0 gpm
- Urinal: 0.2 gallon per flush (gpf)
- Water closet: 1.28 gpf

Some municipalities are encouraging the substitution of fixtures in major renovations with low-flow fixtures, while others are offering incentives to change existing fixtures to these new fixtures.

ONCE-THROUGH COOLING

Some equipment uses domestic potable water for cooling. The water flows though the equipment and then is discharged into the wastewater system at a slightly higher temperature. This water meets potable drinking water standards and should not be dumped into the waste system. Ice machines and stand-alone chillers that are used in some healthcare projects are examples of some of the equipment that requires this once-though cooling.

New code recommendations would not allow potable water for once-through cooling. Instead, mechanical condensing water or captured reuse water such as storm water or air-conditioning condensate would have to be used.

COOLING TOWERS

Cooling towers are used to evaporate water to aid in the building air-conditioning system. Cooling towers that use draft eliminators reduce the amount of water that is wasted with drafts of wind. This is being recommended as a new code requirement for new projects.

Cooling towers also discharge water into the waste system when the cycles of concentration are not calibrated. Another recommended code change would require cooling towers to provide the maximum number of cycles similar to ASHRAE 198.1P Sections 6.3.2.3(b) and 6.4.2.1.

BUILDING CLEANING

Many building cleaning processes use potable drinking water, such as the washing of sidewalks, loading docks, and parking garages. New building codes would require larger buildings to use water brooms or zamboni-type equipment or to use captured rainwater for this purpose. Standards should require marking of hose bibs to the purple pipe water reuse standards.

UPGRADE PIPING IN MAJOR RENOVATION

Many older cities have buildings with lead piping. One recommendation would require major renovations of larger buildings to remove old piping systems containing lead and replace them with new piping that meets current standards. This would not qualify for most LEED credits, except some innovation credits.

REUSE STEAM CONDENSATE

Currently, most codes only state that steam condensate cannot discharge into the waste system at high temperatures. Steam condensate can be collected and used for other services such as boiler makeup, cooling tower makeup, and plumbing flush fixture supply.

STORM WATER REUSE FOR IRRIGATION

Most codes allow capturing storm water and reusing it for site irrigation. Plumbing engineers should make sure the maintenance staff will maintain a filtering system before a system is installed.

STORM WATER REUSE FOR MECHANICAL MAKEUP

In larger buildings, storm water can be collected and reused to offset potable water use in mechanical makeup systems to cooling towers, chillers, and boilers. Some companies make manufactured packaged filter and storage systems. However, some local codes may not accept these systems, while other municipalities are defining water and maintenance standards.

STORM WATER CAPTURE FOR FLUSH FIXTURES

LEED has outlined credits to capture storm water and reuse it for flush fixtures. International codes now have standards that allow these systems, yet local codes do not always accept them.

To include such a standard in local codes, these systems will have to meet backflow prevention and water quality requirements. Some areas are recommending that the water systems shall meet Environmental Protection Agency (EPA) 2004 Guidelines for Water Reuse, Section 2.1.2. Other states such as Florida have adopted purple pipe water reuse standards.

WATER QUALITY STANDARDS FOR NONPOTABLE WATER

Water quality is a concern when it is used for nonpotable use such as mechanical makeup and plumbing flush fixtures. When a fixture flushes, water droplets are introduced into the air, possibly containing contaminants that can expose people to harm. As a result, code officials are looking for appropriate water quality standards for these fixtures.

DRINKING FOUNTAINS

In recent years, consumers have become enamored with purchasing bottled water, and bottled water systems also are being used in buildings. These systems have sustainable and environmental concerns because some of the bottled water quality standards are not regulated, and large amounts of energy are used to transport the water to the site. To respond to this, codes could be changed to not allow bottled water to substitute for drinking fountains.

DUAL FLUSH

Dual-flush water closets use one flush to remove solids from the bowl (typically 1.6 gpf) and also have the option to use less water in a flush to remove liquids from the bowl. A code change movement advocates allowing dual flush as an option with the 1.28-gpf water closets in new construction and major retrofits.

WATERLESS URINALS

Local codes vary greatly on these fixtures. One extreme does not allow them at all, while others allow them with the owner providing a water conservation plan. Some codes have preconditions that must be met before using the fixtures, such as installing water lines in the wall so the fixtures can be changed to water-type fixtures in the future. Plumbing code revisions in the works would eliminate some of these restrictions.

HOW WE CAN HELP

A great deal of debate in local areas concerns these issues. Plumbing engineers should be aware of the current standards and when standards change. Clients may ask the plumbing engineer to be an advocate to the local code review board. Thus, plumbing engineers need to know about these issues so they can decide how they will respond when questions arise. Plumbing engineers should not sit on the sidelines and only respond to code changes. When there is a need, they should step forward and give their professional opinion. Problems occur when plumbing engineers remain silent. PSD

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