

Changes in LEED 2009 for Plumbing Fixtures and Process Water

A 2003 Government Accounting Office (GAO) report stated, "Water managers in 36 states anticipate shortages in localities, regions, or statewide in the next 10 years."¹ The report seemed prophetic when in 2007, Georgia, North Carolina, and other states in the Southeast region faced extreme drought conditions. These conditions prompted structural changes to promote water efficiency in local plumbing and building codes and by local water purveyors.

This year, California is facing drought conditions that are forcing many local water districts to mandate water reduction requirements. The drought also affects the state's agricultural industry, and in February 2009 federal agencies considered cutting off water to thousands of California farms.² Water shortages strain the state's energy systems because hydroelectric production from dams is decreased. More energy is required to pump groundwater from deeper in the ground, and more water is needed for the state's desalination plants that use large amounts of energy.

At one time, water efficiency and sustainable issues were perceived as a small market for eccentric environmentalists. Now water efficiency is seen as a necessity for industries and communities to continue to operate in the future.

The U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system is one set of guidelines that can be used to reduce the amount of water and energy used in a facility. It is becoming the standard for many institutions, companies, and governments.

Each version of LEED raises the bar for efficient buildings. LEED 2009 is no exception, particularly when referring to plumbing systems. Before 2009, the water-efficiency sections of LEED were where designers and LEED facilitators looked to find the "low-hanging fruit" for LEED credits. However, changes in 2009 make water efficiency a major area of sustainability, and these credits can be harder to obtain. In this column, I will look at some of the changes in the LEED guidelines for plumbing fixtures and process water that can affect the plumbing design of a facility.

PLUMBING FIXTURES

One change in LEED 2009 is the number of points that can be received by using low-flow plumbing fixtures. Prior to LEED 2009, reducing water use by 20 percent could earn a point.

For example, in LEED-NC Version 2.2, projects that achieved:

- A 20 percent reduction in water use earned one point
- A 30 percent reduction in water use earned two points
- A 40 percent reduction in water use earned three points

In LEED 2009, the 20 percent water use reduction is now a prerequisite. Reducing water usage by 30 percent earns two points. Other credits are awarded as follows:

- A 35 percent reduction earns three points.
- A 40 percent reduction earns four points.

NEW BASELINE REQUIREMENTS

At first glance, a project designed using Version 2.2 that reduced water by 30 percent should receive two points under LEED 2009. However, that may not be the case. In addition to the prerequisite change, some of the baseline rates for fixtures have decreased, making the reductions harder to achieve. See Table 1 for a comparison of the two versions. (Refer to LEED reference material for more detailed information.)

For instance, the baseline for public faucets is now 0.5 gallon per minute (gpm) instead of 2.5 gpm. Previously, this was one area where a credit could be achieved with no additional cost to the project. Since LEED was introduced, local codes and standards have changed. As a result, many areas now require 0.5-gpm public faucets. In these areas, a designer previously could design a project to code minimum and receive a credit. In 2009, this will not be as easy.

Another small change concerns kitchen faucets. In Version 2.2, the baseline was set at 2.5 gpm, but in LEED 2009 it is now 2.2 gpm. This most likely won't have the same impact as the public faucet requirement; however, it will affect some facilities with kitchen faucets.

HOW THE CHANGES AFFECT OBTAINING WATER-EFFICIENCY POINTS

It is important to note that obtaining LEED credits for water efficiency is different from one particular facility to the next because of the function and size of the facility. For example, some designers think that specifying waterless urinals will garner an automatic credit. However, this may not be true in buildings

Table Comparison of baseline rates for plumbing fixtures

Fixture	LEED-NC Version 2.2	LEED 2009
Toilets	1.6 gpf (3.5 gpf for blowouts)	1.6 gpf (3.5 gpf for blowouts)
Urinals	1.0 gpf	1.0 gpf
Lavatory faucets, private*	2.5 gpm at 80 psi	2.2 gpm at 60 psi
Lavatory faucets, public	2.5 gpm at 80 psi	0.5 gpm at 60 psi
Lavatory faucets, metering	0.25 gallon per cycle	0.25 gallon per cycle
Residential kitchen faucets	2.5 gpm at 80 psi	2.2 gpm at 60 psi
Showerheads	2.5 gpm at 80 psi	2.5 gpm at 80 psi
Pre-rinse spray valves	n/a	1.6 gpm (no psi specified)

*Private lavatory faucets include both residential and private commercial applications such as hotel and hospital patient rooms.

Source: Table adapted from information developed and summarized by the U.S. EPA Office of Water based on requirements of the Energy Policy Act (EPA) of 1992 and subsequent rulings by the Department of Energy, requirements of the EPA of 2005.

that have very few urinals because the urinals account for a small percentage of the building's overall water usage.

How can this change the amount of points a facility will get? For example, a residential apartment facility has the following fixtures:

- 1.28-gallon-per-flush (gpf) toilets or dual-flush toilets (1.1 gpf and 1.6 gpf)
- 0.5-gpm lavatory faucets
- 1.5-gpm kitchen faucets
- 1.5-gpm shower systems

Under Version 2.2, the project could achieve greater than 30 percent water savings and earn two points. Under LEED 2009, the project also would achieve greater than 30 percent savings and earn two points.

However, consider another example using the following fixtures:

- Dual-flush (1.1 gpf and 1.6 gpf) toilets
- 0.5-gpf urinals
- 0.5-gpm lavatory faucets
- 2.2-gpm kitchen faucets

Under Version 2.2, the project could achieve more than 40 percent water savings and earn three points. Yet under LEED 2009, water usage is reduced only between 20 percent and 30 percent. Thus, this project just achieves the prerequisite and receives no credits.

PROCESS WATER

In LEED terminology, process water usually refers to water that is not used for irrigation or plumbing fixtures. Medium to large office buildings or industrial facilities can use more than 50 percent of their water in systems other than the plumbing fixtures. Some of these buildings have cooling towers, food service, water treatment, laundries, and other systems that are connected to the potable water system.

The newer LEED products are incorporating these systems to develop an appropriate point structure. The 2009 LEED for Schools rating system refers to water supplying equipment cooling, garbage disposals, and clothes washers as process water. In the next few years, these process water credits also will be included in the other LEED products. Following are some of the changes.

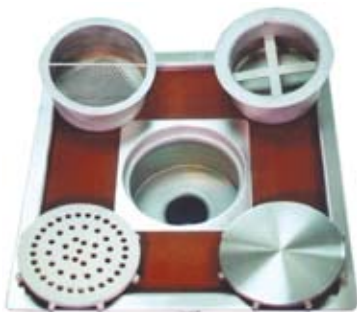
Equipment Cooling

In LEED for Schools, the facility will not qualify for a credit if it is using once-through cooling of equipment. This most often is seen with ice machines. The refrigeration units in ice machines can be water cooled or air cooled. The problem with the water-cooled machines is that they are connected to the building's domestic water system. Whenever the refrigerant system operates, domestic water flows through the machine to reduce the

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temperature of the machine and then flows into the drain. The result is that these systems waste potable water down the drain. The only change in the water was the higher temperature. Thus, most facilities now use air-cooled machines to cool the refrigerant system.

The plumbing engineer often is not responsible for specifying this equipment. Sometimes it is specified by the mechanical engineer, but most of the time these fixtures are specified by the owner's equipment supplier. In such cases, the plumbing engineer should encourage the owner to use air-cooled equipment.

Garbage Disposals

In LEED for Schools the facility will not qualify for a credit if garbage disposals are used. In schools with food service kitchens, disposals use significant amounts of water, particularly in large food service facilities. Thus, during times of drought, municipal water companies may not allow the sale of garbage disposals for installation in homes. This include disposals without a water connection.

Commercial kitchens can use basket strainers instead of garbage disposals. These fixtures capture the food, and the user must dump the strainer into another system. In some cases, composting companies will collect this waste. These fixtures require the user to adopt a new procedure for the wash personnel.

This equipment and the pre-rinse usually are specified by the food service design team. In such cases, the plumbing engineer must coordinate with the appropriate team member to design the piping for this equipment.

Other Process Water Equipment

In LEED for Schools, the facility has a choice to use four of the following five process water equipment items to obtain the credit. The Consortium for Energy Efficiency (CEE) has developed a rating system for the efficiency of appliances. The ratings can be found on their website at cee1.org.

In LEED for Schools, one of the process water items is clothes washers. Clothes washers are listed and must operate below 7.5 gallons per cubic foot per cycle. Commercial washers must be CEE Tier 3a, and residential washers must be CEE Tier 1. These washers are available in most markets. In some regions, they may qualify for a rebate program from the local utility.

The second of five process water items is dishwashers with racks. They cannot use more than 1 gallon of water per rack.

The third item is ice machines, which also are listed. Machines that make less than 175 pounds of ice a day must use less than 20 gallons of water per 100 pounds, while machines that make more than 175 pounds of ice must use less than 30 gallons of water per 100 pounds of ice. Both types must be CEE Tier 3 machines.

The fourth item is food steamers, which must be boilerless and can use no more than 1.4 gpm.

The fifth process water item is pre-rinse sprays, which can use no more than 1.4 gpm.

THE PLUMBING ENGINEER'S ROLE

Water-efficiency credits typically are the responsibility of the plumbing engineer, who specifies fixtures such as water closets and lavatories. Because some of these fixtures are new to the market, it is important for the plumbing engineer to know the products and find the ones they are comfortable specifying. During the design of the project, the plumbing engineer should make sure the building owner and operator are very clear on the fixtures they will have in their facility. Low-flow fixtures can operate differently and require different maintenance requirements when compared to standard fixtures.

For example, LEED now refers to the pre-wash spray that typically is used before a commercial dishwasher in a food service application. It was not unusual for these sprays to use 2.5 gpm or greater. Manufacturers now provide good sprays that operate at 1.6 gpm and can help save water heating energy as well. These sprays work just as well as the old spray units in most applications.

The plumbing engineer should find out early in the design process if a project is trying to obtain LEED certification. Including LEED late in the design or construction project schedule can add expense and effort for the design and construction team.

In the future, water will continue to be a limited natural resource, especially in areas with large population increases. Plumbing engineers will find themselves in the middle of this pull and tug process, as buildings will have to operate effectively and safely with less water. **PSD**

REFERENCES

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2. "Federal water may be cut off from Calif. Farms." *Msnbc.com*, Feb. 20, 2009.

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