Cause no Harm: Sustainable Building Guidelines for Health Care Facilities

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The American Society for Healthcare Engineering (ASHE) has started Green Guide for Health Care (GGHC), a sustainable building program that includes promoting water efficiency in the construction of health care facilities. The guidelines were developed in response to hospital owners that believe health care buildings should follow the Hippocratic Oath and cause no harm to the patients, staff, or neighbors of the facility.

This article should not be used as a handbook to design plumbing systems that meet the GGHC guidelines. Rather the intent is to introduce the guidelines to plumbing industry professionals to better equip them when approached about these systems.

GGHC Approach

The GGHC is based on the premise that health care buildings should promote a healing environment, such as

- cancer treatment centers built without materials linked to cancer,
- pediatric clinics free of chemicals that trigger asthma, and
- hospitals providing healthy food, fresh air, and sunlight.[1]

The GGHC promotes the efficient use of potable water in health care buildings because such facilities should maintain an adequate potable water supply that is a basic necessity for health, help conserve the Earth's supply of fresh water, and reduce the amount of potable water use for process applications.[2]

Sustainability begins with the basic concept of respecting the Earth's biosphere by studying the methods by which the Earth regenerates and sustains its resources and then applying these methods to man-made systems. This is another application of plumbing biospherics that will affect the way plumbing systems are designed and constructed in the future.

On the surface the GGHC approach looks similar to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program in that it is a whole building approach and a voluntary program based on a points system. During the design phase of a new facility, the owner, designers, contractors, and operators agree that sustainability is an important element for the project and decide what sustainable methods are appropriate for the project.

Some building owners will not strive for a building certification and randomly apply sustainable practices to the facility's design and construction. The risk to this approach is that the sustainable methods can be compromised during the design and construction process, and the facility does not retain the degree of sustainability as first envisioned by the owner. As a result, the public does not perceive it as a sustainable facility.

Many owners strive for LEED certification for their buildings because it is a rigorous process that begins during the design phase and continues though construction. In the LEED program the USGBC is a third party that reviews the process and certifies a building as a sustainable facility at the end of construction. The LEED program has grown in popularity because both building owners and users reap the benefits of efficient, healthy, and pleasant buildings.

At this time the LEED program is restricted in its use for health care facilities because it was intended as a general guideline that can be used for all construction projects (a one-size-fits-all approach). However, as the popularity of LEED grew, so did the number of building-specific LEED products, including LEED guidelines for office buildings and single-family homes. The USGBC currently is working on LEED guidelines for health care facilities.

Over the past few years a movement in the health care industry has supported the creation of sustainable construction guidelines that fit the particular needs of health care facilities, which are places that first must do no harm and second must promote health. The health care industry needed a tool to promote many of the developments in the industry that coincide with the goals of the sustainable construction industry. The end result was the development of the GGHC guidelines.

Plumbing Credits

The GGHC is built on the LEED framework with modifications for health care. The program has 94 possible construction points and 32 possible operation points. The seven water-efficiency points are the core of the plumbing-related points.

Prerequisite 1: Potable Water Use for Equipment Cooling. This prerequisite is very different from the LEED rating system, which does not count reductions of potable water for process purposes. This credit restricts the use of potable water for once-through cooling of any equipment. It does not apply to potable water for cooling tower makeup or other evaporative cooling systems.

In health care facilities domestic water often is connected to equipment needing cooling water. An alternate design connecting the equipment to the building's closed loop cooling system can save potable water. An example of such equipment is an ice maker that can be cooled by water or air. This prerequisite does not allow these ice makers to be connected to the potable water system for cooling.

The guidelines recognize that special equipment in hospitals such as a MRI machine requires water cooling. In these cases the equipment can be connected to the building's closed loop cooling water system to maintain temperature. Because this is critical equipment, the guidelines allow potable water as a means for backup cooling.

Water Efficient Landscaping: Reduce Potable Water Use by 50 Percent or no Potable Water Use or no Irrigation. The guidelines offer one point for reducing landscaping water by 50 percent and an additional credit for using no potable water for irrigation. This requirement is similar to the LEED landscaping points. Achieving this point

requires coordination among the plumbing designer, landscape architect, project architect, facility landscape maintenance personnel, and possibly the civil engineer.

During the landscaping discussion the design team may decide to use plants that require little or no irrigation to obtain a possible two GGHC points. Yet some areas in the landscaping most likely will require irrigation. For the project to still be eligible for GGHC points, the plumbing designer could recommend a rainwater harvesting system in which rainwater is captured from the roof drain system, stored in tanks, and distributed to the landscaping by an irrigation system.

Innovative Wastewater Technologies. The intent of this credit is to reduce wastewater generation and potable water demand while increasing the local aquifer recharge. The baseline for this calculation is similar to the LEED guidelines, which base the calculation for plumbing fixture flow rates on Energy Policy Act of 1992 requirements.

This point can be obtained by reducing the amount of wastewater by at least 50 percent by using ultra-low-flow or no-flow plumbing fixtures or by treating 100 percent of the wastewater on site to tertiary standards. This credit could be difficult for a health care facility to obtain because of the type of contaminants in wastewater from a health care facility and the reluctance to use ultra-low-flow fixtures.

Domestic Potable Water Use Reduction. The intent of this credit is to maximize potable water efficiency within the building and to reduce the burden on municipal water supplies and wastewater systems. One point can be obtained by reducing water usage by 20 percent, and an additional point can be obtained by reducing water use by 30 percent. This calculation is based on plumbing fixtures meeting Energy Policy Act requirements. Process water such as cooling tower makeup is calculated on another point.

This point can be obtained by using low-flow lavatories, sinks, and showerheads. Water used for scrub sinks and other clinical use is exempt. In many cases the use of waterless urinals in the public toilets will help in obtaining this point. Plumbing fixture manufacturers are introducing new products such as dual-flush water closets that also will help in obtaining the point.

Dual-flush water closets have a special flush valve that allows the user to decide between two types of flushes. The standard 1.6-gallon flush is designed to clear solids out of the bowl. The second option is designed to flush liquids out of the bowl with less than 1.6 gallons of water. The use of these fixtures will require some education of the public. The installation, cost, and housekeeping requirements of the dual-flush units are very similar to standard units.

The plumbing designer should be educated about waterless urinals before recommending or specifying their use. While they use no water compared to standard urinals, they require local code approval and a change in the housekeeping routine. Waterless urinals require maintenance of a trap and regular daily wash down by the housekeeping staff, which may make them inappropriate for some applications.

Process Water Use Reduction: Measurement and Verification. The intent of this point is to provide for the ongoing accountability and optimization of building water consumption performance over time. To obtain this credit the plumbing designer installs water measurement devices such as water meters in laboratory, dietary, central sterile, and other areas. These devices allow the operations staff to monitor water usage over time, fix leaks in systems, and encourage water-saving techniques.

Process Water Use Reduction: Low or no Water Use in Building System Equipment. The intent of this point is to reduce or eliminate the use of potable water for nonpotable process use in building system equipment. For this credit the plumbing designer should use building system equipment such as compressors and cooling towers that reduces the use of potable water by at least 10 percent or a minimum of 100,000 gallons annually.

In a hospital this can apply to medical gas equipment such as vacuum pumps and air compressors. Liquid-cooled or liquid-sealed units have been connected to a building's potable water system. These systems can use either cooling water or nonpotable water for cooling and/or sealing to obtain this point.

Some areas have a water distribution system available called a water reuse or purple pipe system. This is water that is not cleaned to potable water standards and is available for process water use or landscaping. The intent of this point is to take advantage of this type of system where it is available. Other systems can be used that collect the building condensate or the building rainwater and then use this water for the process water needs of a building.

Many other credits applying to plumbing design, such as energy savings and using recycled content, can be found in the GGHC material. The GGHC is now a pilot program and is intended to be used by the USGBC as a base for the LEED health care guidelines in the future. ASHE is offering much support to help projects work through these guidelines. Because the program is in the pilot phase, the association encourages feedback on ways to improve the process. Log on to GGHC.org for more information. ■

References

1. ASHE-GGHC–FactSheet. GGHC.org, site accessed Sept. 9, 2005.

2. Green Guide for Health Care, Version 2.0 Pilot, August 2005.

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