BY WINSTON HUFF, CPD, LEED AP

Water-efficiency Manuals Help Organizations and Cities Save Water

Large private and public organizations maintain and build a significant number of buildings. Because of the impact of buildings on the environment, these organizations are in a position to have a positive effect on their surroundings. When these organizations build and maintain facilities that use less energy and water, contractors, designers, and operators learn from their example.

City governments are an example of these organizations. On one hand, cities face real infrastructure, environmental, and budget problems, but government officials are coming to the realization that the city's water, storm water, and waste infrastructures will not be able to support future expansion if buildings are constructed without efficient utility systems.

On the other hand, municipalities are one of the major organizations building, maintaining, and operating facilities. City governments commonly are one of the top 10 largest water and energy consumers in a region because they build and maintain a wide range of building types, including schools, courthouses, office buildings, jails, police stations, fire stations, community centers, bus stations, bus maintenance facilities, water treatment plants, and waste treatment plants.

To deal with these issues, cities and other organizations are developing ways to start building and operating their facilities to minimize negative infrastructure and environmental problems in the future. Changing city programs and policies is not easy, but it must be done.

CASE STUDY: NEW YORK CITY

I am part of a team that is addressing some of these issues for New York City. By the year 2030, the population of New York City is expected to increase 14 percent over the year 2000 population to approximately 9.1 million people. Most roads and transportation systems are easily expandable; however, it is harder to expand the infrastructure for the water and wastewater systems. Building new water tunnels to supply water to the city is expensive and time consuming. The city also is facing the challenge of combined sewer overflows (CSOs), from which untreated waste, trash, oil, and other pollutants flow directly into city waterways.

City officials realized that a large number of existing properties and new projects in the city were under their control and that one way to address these issues was to improve the way the city operates. If government-owned buildings made a positive impact, other organizations might follow their lead. This sounds easy at first, but when existing policies and procedures are reviewed, changing the way a city operates is a huge undertaking, and a similar situation exists with other large organizations such as universities, industries, and corporations. It is a challenge to change direction.

One way the City of New York started to address these issues was to bring together experts from particular fields to look at the issues and develop manuals that the city, contractors, and operators could follow. Manuals on lighting and geothermal energy have been produced, and in June a water-efficiency manual was published (see Figure 1). The city also made a commitment that all city buildings would be LEED certified.

For the water-efficiency manual, the first step was to allocate resources to develop the manual and then encourage city departments to take an active role in the development process. The next step was to bring in consultants and experts in the field who had experience working with successful environmental projects.

Formulating the Plan

How can such a drastic change in behavior happen with so many different types of buildings, contractors, operators, designers, and budgets? When the consultants were brought together, we started by examining how the various design, construction, and operations teams worked to help them identify the tasks they were to perform and when those tasks would take place. The next step was to develop different strategies for the different sustainable approaches to buildings. For example, one goal is to achieve LEED certification, while other building projects take a more aggressive approach to achieve LEED Gold or Platinum certification (see Figure 2).

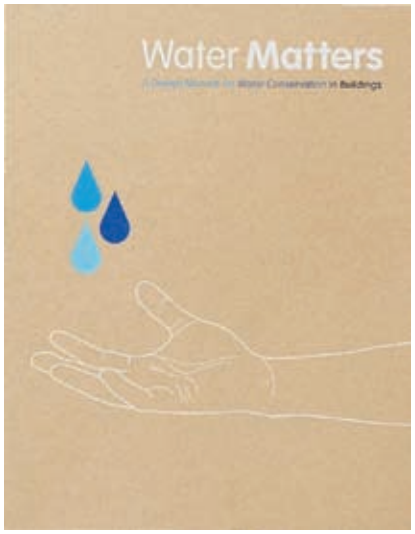

Figure 1 New York City's Water Matters water-efficiency design manual

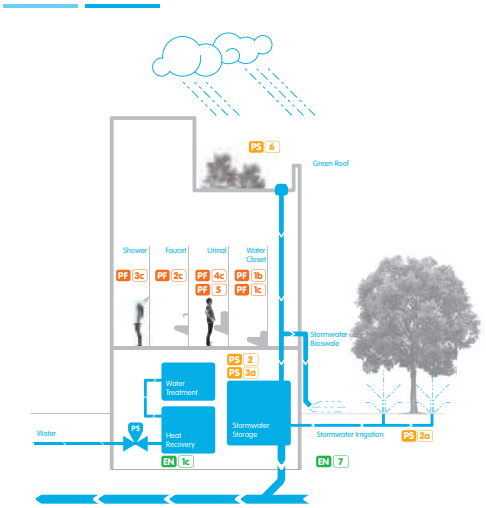

Figure 2 Ultra-efficient strategy to achieve LEED Platinum
Source: Water Matters, New York City Department of Design and Construction

Then we looked at the different systems that handled the water flow in buildings, such as plumbing fixtures and mechanical and process systems. The type of building plays an important role in water efficiency. For example, an office building should utilize water-efficient plumbing fixtures in restrooms, while a restaurant would see greater water savings by installing an efficient dishwashing procedure and equipment.

Developing a Strategy Matrix

One way to ensure that all of the issues get addressed is to develop a strategy matrix, which lists the technologies that can be used for the different sustainable approaches in various building types and helps illustrate how the technologies can be used to achieve the water-efficiency goals.

The portion of the matrix in Figure 3 shows the water closet section. The matrix helps the building team find the best technologies for the particular sustainable strategy for the type of building. For example, if a healthcare facility is concerned about the clinical issues associated with low-flow fixtures, 1.6-gallon-per-flush (gpf) water closets could be used because water closets are not a significant percentage of such a building's water load. However, this is not the case for public assembly facilities because water closets represent a larger portion of their water usage. 1.28-gpf or less fixtures may be a better fit, and they also can contribute to LEED credits. Dual-flush fixtures might be a better choice for office buildings where the same people use the fixtures every day because in these situations, the users are familiar with the dual flush and tend to use the lower flow flush when needed.

The use of a matrix can help the owner, operators, designers, contractors, and users focus on the important water issues in a building. For instance, building teams all over the country spend hours debating the water flow in the public lavatory while forgetting the design and operation of the cooling tower, even though in some cases the cooling tower uses more water than the plumbing fixtures. Building owners might assume that if they use plumbing fixtures that are 20 percent efficient, the total building water usage will decrease by 20 percent. However, the total building water usage will not decrease by 20 percent because the building has landscape irrigation, cooling towers, and food service dishwashers. As a result, the plumbing fixtures are a smaller percentage of the overall water usage for the building.

Choosing Suitable Systems and Products

The manual also discusses current issues such as the different types of urinals and when each type should be used. It encourages owners to utilize waterless urinals before installation to ensure that they are the right fit for the type of building they operate.

In addition, the manual discusses energy usage in water systems. Many types of water heaters are available, including instantaneous, point of use, solar, electric, and gas. The manual encourages looking at the whole building to develop a system that meets the needs of the staff and the energy meter.

City governments also find themselves responsible for vehicle wash. If you think about it, in a typical day you may see police cars, buses, subway cars, and/or fire trucks pass by you. All of these vehicles have to be washed on a regular basis. New York City is very proud of the way it washes subway cars and buses, which uses rainwater during the process. The manual goes into detail describing these different types of systems. (See the May 2010 "Green Column" for a description of one water-efficient New York City vehicle maintenance facility.)

Dividing the Responsibilities

The manual also describes the responsibilities for the different building professionals such as plumbing engineers. Too many times plumbing engineers are brought in after the programming stage of a project, and as a result the plumbing engineer is limited in the amount of expertise and input he can provide. This manual encourages input from the plumbing engineer early in a project, before the programming and budgets are set.

For example, if the building has a goal to reduce water usage, plumbing engineers can provide input on the effective ways to reduce water usage to minimize the impact on the budget. Plumbing engineers can help make efficient choices in plumbing fixtures. If more water efficiency is required, they can explain other technologies such as capturing rainwater for irrigation or capturing HVAC condensate for cooling tower makeup.

TAKING ACTION

The New York City water manual is one example of what one city is doing. Other cities and organizations have undergone similar activities. Some update their websites with water and energy standards, while others have published standards. The important first step is to take action and start developing methods to handle these problems before problems start occurring. PSD

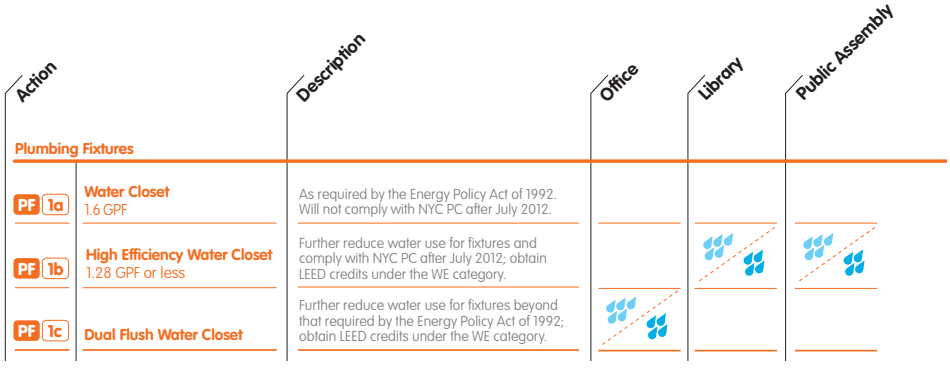

Figure 3 Strategy matrix for water closets
Source: Water Matters, New York City Department of Design and Construction

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