

6.1 Water Management

The goal of effective water management is to reduce water consumption without compromising the performance of equipment and fixtures. Using water more efficiently is a green strategy for several reasons: it reduces pressure on sometimes-limited water resources, reduces the amount of energy and chemicals used for water and wastewater treatment, and, to the extent that the use of *hot* water is reduced, increases energy savings—with associated environmental benefits. In addition to these benefits, water conservation in Federal facilities saves tax dollars. Facility managers should conduct comprehensive audits of water use in all buildings and landscapes under their supervision. Not only is this an excellent idea, it is mandated by Executive Order 12902, “Energy Efficiency and Water Conservation at Federal Facilities.” The water audit should be accompanied by an examination of available water management techniques and be followed by implementation and monitoring of appropriate measures.

Opportunities

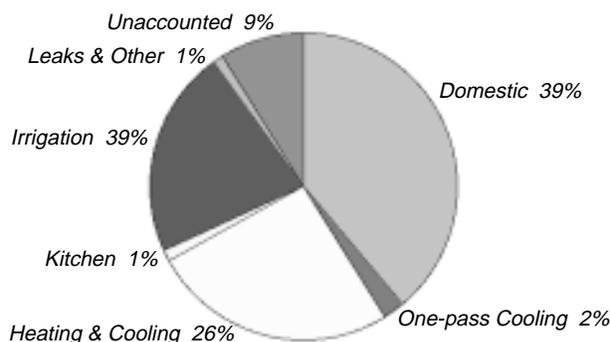
Water management techniques can and should be implemented in all Federal facilities. These techniques include (1) reducing losses by repairing leaky faucets and pipes; (2) reducing the overall amount of water consumed (replacing toilets with low-flush models, for example); (3) finding more sustainable sources of fresh water (rainwater harvesting, for example); (4) managing water more responsibly after use (using graywater for irrigation, for example, and more responsible wastewater treatment); (5) where appropriate, enforcing conservation-based water pricing; and (6) forming partnerships with local utilities. Water management also involves emergency planning for droughts and implementation of those plans when conditions require. Most water management strategies can be implemented at any time, although a few—such as installation of an alternative wastewater treatment system—are far more easily done during major building renovations or as part of new construction. An important integration opportunity is to reduce hot water use, which both reduces overall water consumption and saves energy.

Technical Information

Water use in the United States has more than doubled in the past half-century—from about 180 billion gallons (680 billion liters) a day in 1950 to more than 400 billion gallons (1.5 trillion liters) a day in 1995. Federal agencies collectively spend more than \$500 million annually on water and sewer costs.

Replacing old plumbing fixtures can save huge quantities of water. The standards established for water consumption by the Energy Policy Act restrict showerheads

Water Use in Commercial Buildings



to 2.5 gallons (9.5 liters) per minute, urinals to 1 gallon (3.8 liters) per flush, faucets to 2.2 gallons (8.3 liters) per minute at 60 psi (410 kPa), and toilets to 1.6 gallons (6 liters) per flush at 80 psi (550 kPa).

Water management measures that are cost-effective—that is, with a payback of 10 years or less—can be implemented immediately. Note that the true cost of water must include costs to heat, cool, and pump it; costs of treatment before use (such as softening or filtration); and costs to treat or dispose of wastewater. Dollar savings from reduced water and energy use as a result of water conservation projects can be substantial.

A successful water management program begins with the development of a comprehensive plan that includes a thorough analysis of water use throughout a facility (see “Eight Steps to a Successful Water Management Plan”) and a review of the relationship between the facility and water supplier (typically, a municipal utility company).



In 1992 the Nuclear Regulatory Commission’s Phillips Building saved 1.4 million gallons (6.4 million liters) of water compared with usage for the previous year. This was achieved by replacing many plumbing fixtures that were more than 30 years old and retrofitting other fixtures to improve efficiency—sometimes at very low cost. One hundred faucets were retrofitted with new seats and washers, for example, at a cost of about \$1,000. Monthly inspections ensure the continuation of this very successful program. How did it get started? It began with a water management plan similar to the one outlined on the next page.

EIGHT STEPS TO A SUCCESSFUL WATER MANAGEMENT PLAN

- 1. Gather information.** Start with the facility floor plan, operating schedules, number of employees and visitors, and maintenance/janitorial schedules. List all fixtures and the manufacturers' data on rated flow rates. Determine outdoor water applications, quantity, and schedule. Obtain utility name and water/sewer bills for at least the past two years. Check meter calibration results to adjust quantities, if necessary.
- 2. Conduct a comprehensive facility survey.** A basic water audit can be completed by qualified staff using published tools and fixture-use assumptions; a more complete audit may require assistance from water efficiency professionals.
- 3. Explore and evaluate water management options.** With a water audit in hand, determine whether fixture replacement and changes in maintenance procedures are needed. Just a single constantly running toilet, for example, can waste 6,000 gallons (23,000 liters) per day!
- 4. Conduct life-cycle cost analyses and explore financing options.** Total water cost must include water purchased from utilities, pumping energy, pretreating, water heating and cooling, chemical treatments (e.g., cooling towers), and sewer costs. Use the NIST BLCC program to compare alternative plans. Where appropriate, consider the GSA Federal Buildings Fund if there are energy savings involved. Check into utility programs or ESPCs with private firms. Review the water utility's rate structure and determine whether it encourages conservation.
- 5. Develop a water management plan and work schedule.** Set priorities for the changes to be made based on current water use, occupant needs, and life-cycle cost analysis. Determine the schedule of implementation and associated funding.
- 6. Inform building occupants about water management.** Send a letter to everyone telling them about the plan. Post signs near equipment to make occupants aware of water savings initiatives. Set up a "hotline" to report leaks or other wastes of water. Start a water information section in an in-house newsletter detailing water savings.
- 7. Implement the water management plan.** Check with contractors to ensure that work is going as planned. Check bills to verify consumption reductions as the program evolves. Immediately address problems that arise for users.
- 8. Monitor the water management plan.** Carefully check to ensure that savings are occurring. Make regular contact with the operating and maintenance staff to insure their active participation.

The following sections of this guide address more specific aspects of water conservation, as well as innovative water source and wastewater treatment options.



More than 300 Waterless urinals like this, made by the Waterless Company of Del Mar, California, were installed at the Jet Propulsion Laboratory in Barstow, California. The urinals have reduced annual water consumption by 13 million gallons (49 million liters), saving \$52,000 per year in water and sewer costs. A lightweight biodegradable oil in the sophisticated



Source: The Waterless Co.

EcoTrap® allows urine to pass through while serving as a trap to block odors from entering the restroom. The oil is replenished on a regular maintenance schedule based on usage.

References

Water Management: A Comprehensive Approach for Facility Managers, General Services Administration, Washington, DC, 1995.

Water Audits and Leak Detection, American Water Works Association, Denver, CO, 1997; (703) 684-2492.

Facility Manager's Guide to Water Management and Water Efficiency Manual for Commercial, Industrial, and Institutional Facilities. Though regional (Arizona and North Carolina, respectively), both reports are useful and can be downloaded as pdf files from the WaterWiser Web site (www.waterwiser.org).

Contacts

Water management training courses are offered by FEMP. *WATERGY, A Water and Energy Conservation Model for Federal Facilities* is also available to aid in water conservation audits. Call the FEMP Help Desk, (800) DOE-EREC (363-3732), and see the FEMP Web site, www.eren.doe.gov/femp/.