

Water Efficiency

Sound Principles of Water Management



Optimizing facility water use means more than conducting an in-plant study and preparing a report. Water efficiency measures must be viewed holistically within a business' strategic planning. Firms that use water more efficiently now will have a competitive advantage over companies that choose to wait. A successful program must prioritize needs, set well-informed goals, establish current performance minimums and carefully plan a course for action. Consider these principles when establishing water efficiency initiatives.



Categories of Water Efficiency Measures

- Reducing losses (e.g., fixing leaking hose nozzles)
- Reducing overall water use (e.g., shutting off process water when not in use)
- Employing water reuse practices (e.g., reusing washwater)



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changing behavior vs. equipment

Equipment changes may be viewed as a “permanent fix” to achieve water efficiency. Changing employee behaviors, such as an operating procedure, may be viewed as a quick and inexpensive way to achieve similar savings without up-front capital expense. In reality, both the technical and human side of water management issues must be addressed. Consistent training and awareness in combination with proper tools and equipment will achieve more permanent water savings.

Prioritizing Needs and Setting Goals

Before considering any water efficiency measure, management must first ensure water use performance is consistent with:

- Public health sanitation requirements such as the U.S. Department of Agriculture, the Food and Drug Administration and state and local health regulations.
- Environmental requirements such as water quality reuse rules and criteria.
- Other health and safety requirements, such as state and local building codes and fire safety codes.
- Customer quality expectations, such as product cleanliness specifications.

Closer examination of the above requirements may lead to more water-efficient ways to achieve and exceed health, safety and customer quality requirements. With the above priority established, consider the following suggestions before embarking on program goal setting.

- Any program should include water supply and wastewater utilities in the process. Involving utilities can help align water use goals for both water users and suppliers. Utilities may have demand-side management concerns such as meeting summer’s increased demands or

meeting a peak hourly demand. These specific concerns can be factored into a facility water management program.

- Anticipate increased water and wastewater service costs when considering options. Ask utilities to provide any expected increases.
- Anticipate future increases in production or number of employees that will influence water consumption.
- Use total cost accounting methods to perform economic comparison of water-efficient techniques. Consider water and wastewater costs, on-site pretreatment costs, marginal cost for capacity expansion and energy savings (especially heat).
- Encourage water and wastewater utilities to provide rebates and other financial incentives to offset the cost of implementing a water conservation measure. Use the efficiency/conservation plan as a bargaining point.
- Program goals should not only consider the technical side for water efficiency, but also should consider the human side, such as changing behaviors and attitudes toward water use.
- Do the simple tasks first to gain acceptance and positive feedback for the program.

Use internal and external benchmarking techniques to help optimize water consumption.

Typical Water Balance Findings

Understanding water use at a facility is imperative to appropriately prioritize areas to focus time and resources. Figures 2-1 through

2-6 show examples of water use distribution (water balances) for common commercial, industrial and institutional settings. Each facility should determine its own unique water balance to best target opportunities.

Figure 2-1

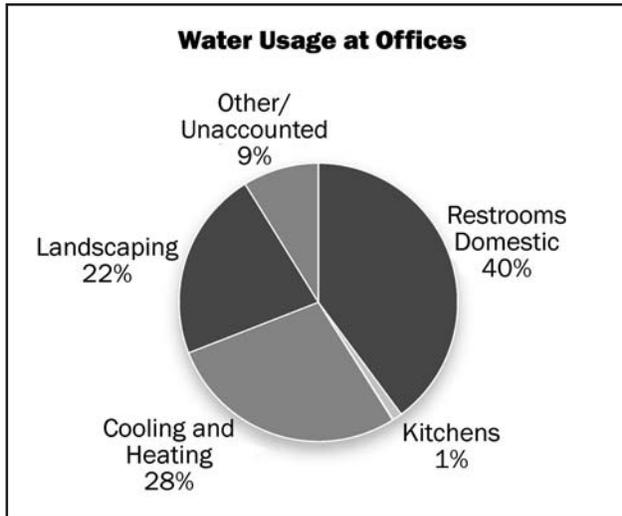


Figure 2-2

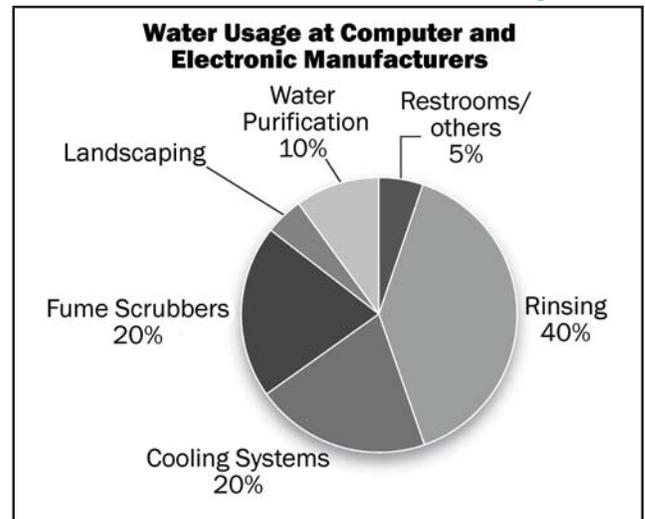
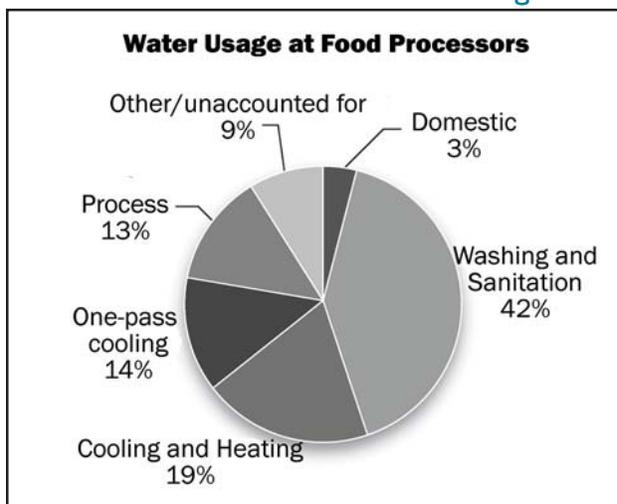


Figure 2-3



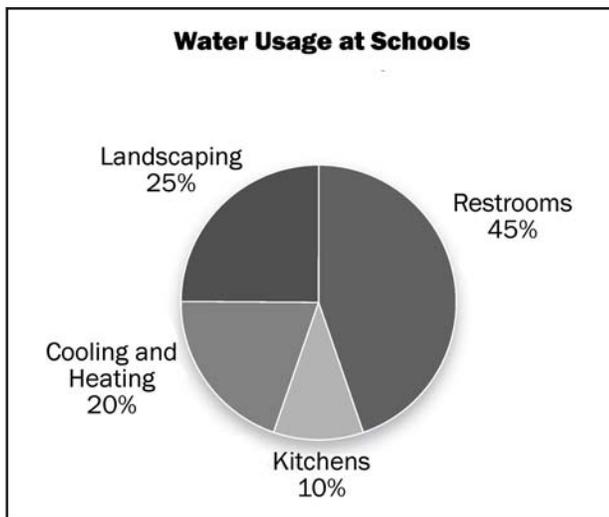


Figure 2-5

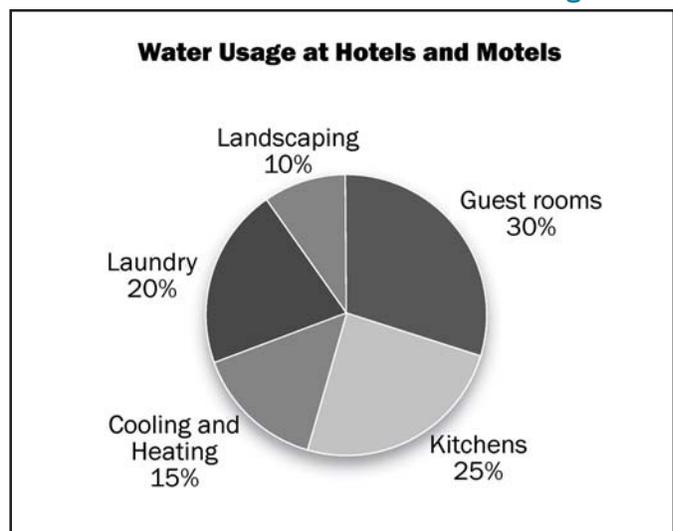
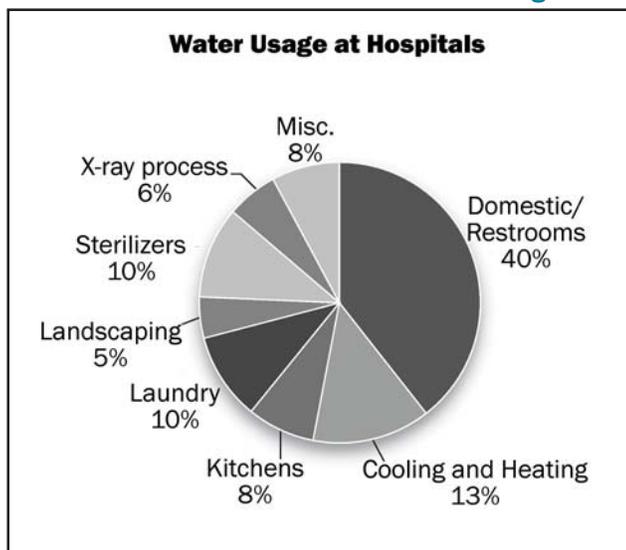


Figure 2-6



The guidance presented in this chapter provides the framework to pursue water efficiency measures. Chapter 3 presents a six-step process to guide facility staff through the details of enacting a successful water efficiency program.

Using TQM and Benchmarking Tools

Facility managers have a variety of total quality management tools to help plan, develop and implement water efficiency measures. These tools include self assessments, statistical process control, ISO 9000 and 14000, process analysis, quality circle and many others. Benchmarking, too, can be an important TQM tool to improve water use efficiency. Benchmarking is a process of comparing one’s own operational performance to other organization’s to become “best in class” and make continual improvements. Benchmarking is more than simply setting a performance reference or comparison, it is a way to facilitate learning for continual improvements. The key to the learning process is looking outside one’s own business to other industry sectors that have discovered better ways of achieving improved performance. Benchmarking can be performance-based, process-based or strategic-based and can compare financial or operational performance measures, methods or practices or strategic choices.

Five Steps of a Benchmarking Process

Planning

Managers must select a process to be benchmarked. A benchmarking team should be formed. The process of benchmarking must be thoroughly understood and documented. The performance measure for the process should be established (i.e. cost, time and quality).

Search

Information on the “best-in-class” performer must be determined. The information can be derived from the company’s existing network, industry experts, industry and trade associations, publications, public information and other award-winning companies. This information can be used to identify the best

Benchmarks (Annual Basis)	
Hotels/Motels	0.079 - 0.165 thousand gals. (Kgal)/sq. ft. 30.2 - 39.5 Kgal/room
Nursing/ Assisted Living	0.062 - 0.101 Kgal/sq. ft. 32.8 - 40.7 Kgal/bed 25.4 - 39.6 Kgal/apartment
Restaurants	0.17 - 0.21 Kgal/sq. ft. 10.6 - 14.3 Kgal/seat
Schools	0.012 - 0.019 Kgal/sq. ft. 1.7 - 2.7 Kgal/student
Source: Benchmarking Task Force Collaboration for Industrial, Commercial & Institutional Water Conservation, Colorado Waterwise Council, June 2007.	

benchmarking partners with which to begin cooperative participation.

Observation

The observation step is a study of the benchmarking partner’s performance level, processes and practices that have achieved those levels and other enabling factors.

Analysis

In this phase, comparisons in performance levels among the facilities are determined. The root causes for the performance gaps are studied. To make accurate and appropriate comparisons, the comparison data must be sorted, controlled for quality and normalized.

Adaptation

This phase is putting what is learned throughout the benchmarking process into action. The findings of the benchmarking study must be communicated to gain acceptance, functional goals must be established and a plan must be developed. Progress should be monitored and corrections in the process made accordingly.

The benchmarking process should be interactive. It should also recalibrate performance measures and improve the process itself.

Self-Assessment Checklist



What efforts has your facility already made in water efficiency? Several questions for facility managers are listed below to help gauge a facility's present water efficiency performance.

Top Management Commitment and Resources

- *Is water efficiency included in the company's environmental policy statement?*
- *Are water efficiency responsibilities delegated?*
- *Are quantitative goals established and tracked?*
- *How are water efficiency goals communicated to employees?*
- *What incentives and feedback loops exist for employee participation, suggestions and increased awareness?*
- *Has your facility taken advantage of available help and resources from your utilities, assistance programs, vendors or consultants?*

Water Efficiency Survey

- *Do you know the actual breakdown of your water uses: cooling and heating, domestic uses, process rinsing, cleaning activities, kitchens, laundries, landscaping, water treatment regeneration, evaporation, leaks and others?*
- *Do you know your life cycle water costs for supply water, wastewater treatment, sewer/discharge and heat and mechanical energy losses?*
- *Are you doing simple things such as leak inspections, eliminating unnecessary uses and using timers? Are these practices institutionalized?*

Identifying Opportunities - Target Areas for Water Reduction

DOMESTIC

- *Are code-conforming 1.6 gpf commodes, 0.5 to 1.0 gpm faucet aerators and low-flow 1.5 to 2.5 gpm showerheads in use?*

HEATING/COOLING

- *Has once-through cooling water used in air conditioners, air compressors, vacuum pumps, etc., been eliminated with the use of chillers, cooling towers or air-cooled equipment?*
- *Has blow-down/bleed-off control on boilers and cooling towers been optimized?*
- *Is condensate being reused?*

PROCESS RINSING AND CLEANING

- *Have you considered improved rinsing techniques such as counter-current systems, sequential use from high quality to lower quality needs, conductivity flow controls, improved spray nozzles/pressure rinsing, fog rinsing or agitated rinsing?*
- *Is water turned off when not in use by flow timers, limit switches or manually?*
- *Is the life of an aqueous bath being maximized via filtration and maintenance control?*
- *Are “dry clean-up” practices used instead of hosing down, and is first-pass pre-cleaning conducted with squeegees, brushes or brooms?*

ON-SITE WATER REUSE

- *Is water quality matched with water quantity?*
- *Have reuse applications been examined for process water, landscaping irrigation, ornamental ponds, flush water and cooling towers?*

LANDSCAPING

- *Are low-flow sprinklers, trickle/drip irrigation, optimized watering schedules and water placement, preventive maintenance and xeriscaping techniques in place?*

KITCHENS

- *Are “electric eye” sensors for conveyer dishwashers installed?*
- *Have new water and energy efficient dishwashers been examined?*

Water Efficiency Action Plan

- *Have you performed a cost analysis on water efficiency opportunities?*
- *Do you have a prioritized implementation schedule?*
- *Are water users informed of the changes and communication channels open for feedback?*

Tracking and Communicating Results

- *Do you post monthly water usage rates to employees and management?*
- *Are your water efficiency achievements being recognized in case study articles, media coverage, mentoring to other businesses, business environmental exchange programs or in award programs?*



The North Carolina Division of Pollution Prevention and Environmental Assistance provides free, non-regulatory technical assistance and education on methods to eliminate, reduce, or recycle wastes before they become pollutants or require disposal. Telephone DPPEA at (919) 715-6500 or (800) 763-0136 for assistance with issues in this fact sheet or any of your waste reduction concerns.

