



Saving Water in Commercial and Institutional Facilities with WaterSense®

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U.S. EPA

Energy Star Partner Meeting 2012

What is WaterSense?

WaterSense is voluntary partnership and labeling program launched by EPA in 2006

- Addresses water efficiency and performance
- Labeled products are independently certified to use at least 20% less water



WaterSense Product Evaluation Factors

look for



WaterSense uses the following factors in determining which products to label

Products must:

- Offer equivalent or superior performance
- Be about 20 percent more water-efficient than conventional models
- Realize water savings on a national level
- Provide measurable results
- Achieve water efficiency through several technology options
- Be effectively differentiated by the WaterSense label
- Be independently certified



WaterSense Labeled Products



Flushing Urinals



Lavatory Faucets



Irrigation Controllers



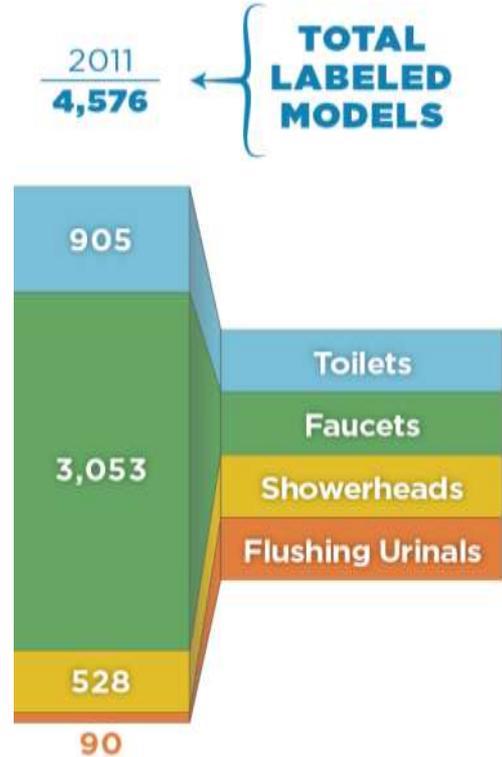
New Homes



Tank-Type Toilets



Showerheads



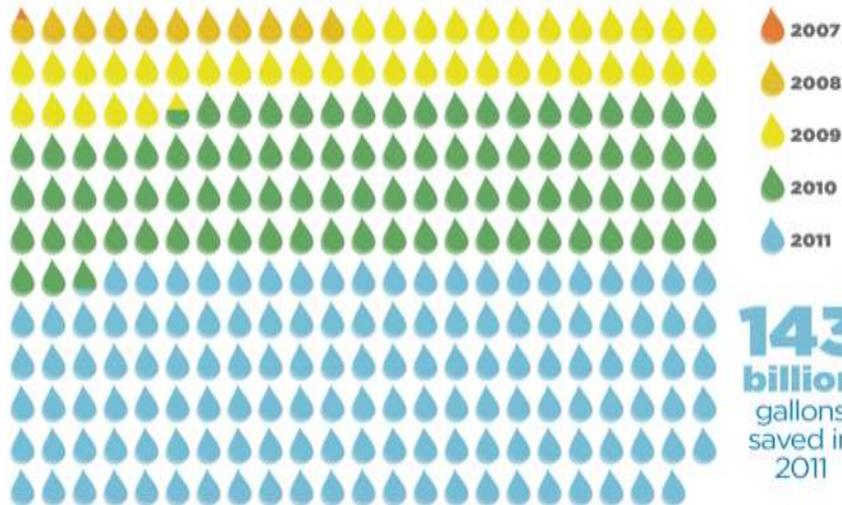
Water factors are also included in many ENERGY STAR qualified products

look for



Savings add up! 2006-2011 Results

287 billion gallons of water saved since 2006!



That's enough water to supply all the homes in **Georgia** or **Arizona** for a year!

WaterSense has helped **reduce** the amount of **energy** needed to heat, pump, and treat water by

38.4 billion kilowatt hours,

enough to supply a year's worth of power to more than



...and **saving consumers \$4.7 billion** in water and energy bills



More than 2,600 WaterSense partners EPA tools to help them

IMAGINE
YOUR KIDS
RUNNING
THROUGH THE
WATER SPRINKLER,
MINUS THE WATER.



It's a fact: the average person unknowingly wastes up to 30 gallons of water every day. But there is something we can do: just practice simple water saving actions, and that will go a long way in ensuring an adequate water (and sprinkler) supply to the future. Like to learn more? Visit www.epa.gov/watersense.




We're for Water



Be proud. Be strong.
Be a fixer of leaks.

It's time to water the trees, the plants and the lawn in an efficient way. WaterSense offers a variety of products and services to help you save water. Visit www.epa.gov/watersense for more information.



Color These Water Wasters—But Don't Be One!



Color these water wasters and learn how to save water. Visit www.epa.gov/watersense for more information.

Drip. Drip. Drip.



Hi, I am Flo, the Wire for Water spokesperson. In the United States, leaks in our homes waste enough water for every kid to take a bath every day. Help me complete the activities inside to fix the leaks and save water!



Community-Based Social Marketing Workbook



A Guide to Using Social Marketing to Help Fix and Prevent a WaterSense® Home for Water Conservation



As much as **50 percent** of the water used outdoors is wasted from inefficient watering methods and systems.



look for **WaterSense** Curb your water waste!

How to feel good about yourself every time you pay the water bill.



Setting intentions is as easy as 1-2-3:

1. Check your toilet for leaks.
2. Tighten or a faucet washer.
3. Replace an old showerhead with one that's WaterSense labeled.




Fix a Leak Week

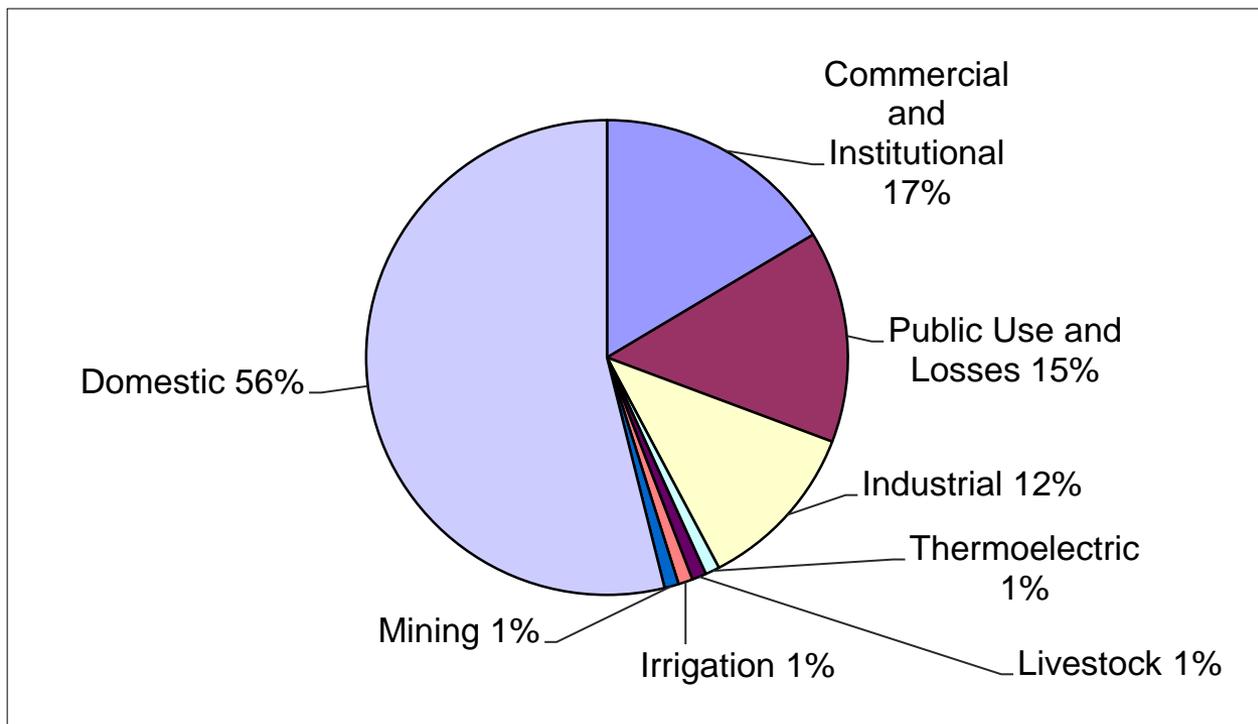
March 12-18, 2012



WATER USE IN THE CI SECTOR

Water Use by the C&I Sector

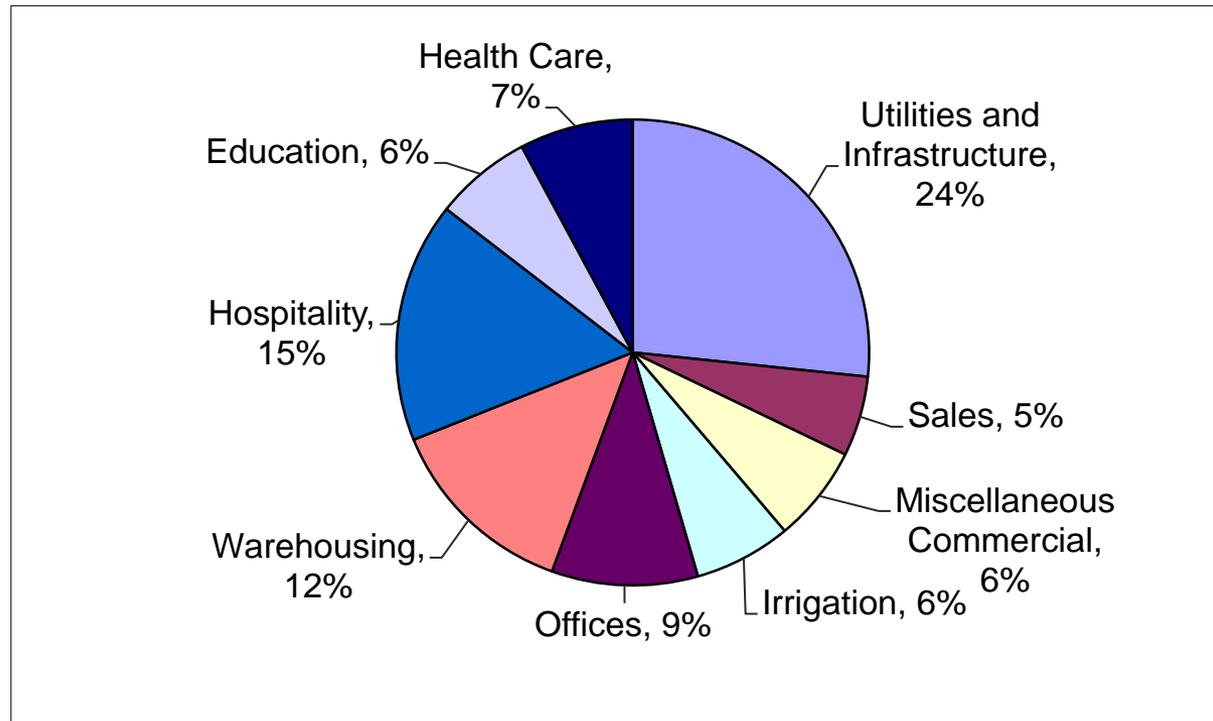
- The C&I sector accounts for approximately 17% of the US public water supply withdrawals



*Source: Modified from *USGS Estimated Use of Water in the United States in 1995*

Water Use by C&I Subsectors

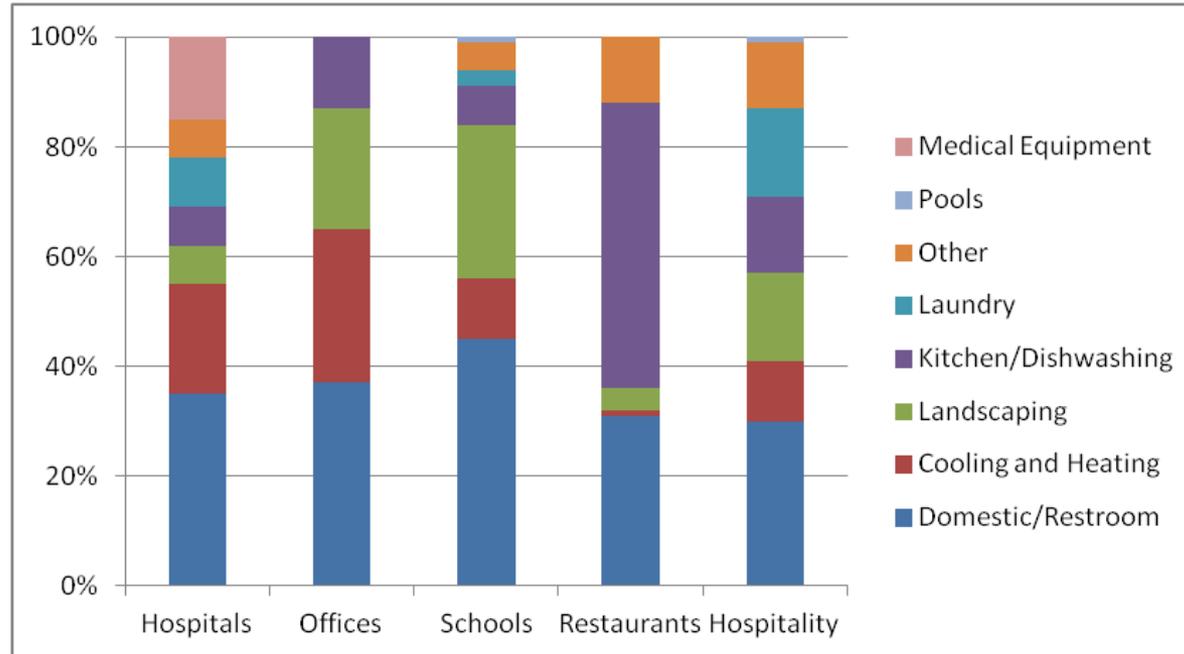
- Utilities and infrastructure, hospitality, and warehousing are the largest C&I subsector water users



*Source: AWWA Research Foundation's *Commercial and Institutional End Uses of Water*

Water Use within C&I Subsectors

- Domestic/restroom, cooling and heating, and landscaping are typically largest uses of water across C&I subsectors



*Created from New Mexico Office of the State Engineer's *Water Conservation Guide for Commercial, Institutional, and Industrial Water Users*; AWWA Research Foundation's *Commercial and Institutional End Uses of Water*; East Bay Municipal Utility District's *WaterSmart Guidebook: A Water Use Efficiency Plan Review Guide for New Businesses*; AWWA's *Helping Businesses Manage Water Use, A Guide for Water Utilities*.

WaterSense Activity on CI

- In 2009 EPA released a white paper *Water Efficiency in the Commercial and Institutional Sector: Considerations for a WaterSense Program*
 - Summarized current state of water use knowledge in the CI sector
 - Outlined the possibility and options for expanding WaterSense to commercial and institutional sectors
- Held two stakeholder meetings and accepted written comments



2009 WaterSense CI Meeting



- Primary stakeholder recommendations on C&I options and opportunities included:
 - Target specific subsectors based on water consumption and stakeholder interest
 - Remain focused on product labeling and align product specifications with a subsector based approach
 - Support development of building certification and labeling program (or work to improve existing programs)
 - Issue best management practices for water uses applicable to multiple sectors
 - Label certification programs for professionals in the C&I sector including water auditors, facility managers, plumbers
 - Create a national repository for C&I water use and benchmarking data
 - Create an awards program to recognize early adopters

Since 2009

- Since 2009 WaterSense has been working to address several of the recommendations, including:
 - Developing specifications for products used in the C&I sector
 - Compiling comprehensive water-efficiency best management practices
 - Working with ENERGY STAR to support tracking of C&I water use and develop benchmarks
 - Working with ENERGY STAR to initiate an awards/challenge program for C&I buildings that save the most water

WaterSense at Work

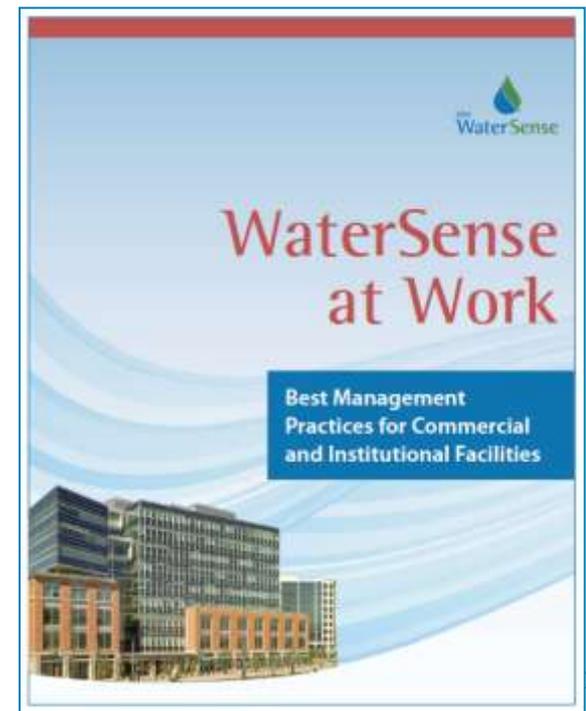
Coming November 1

look for



WaterSense at Work is a comprehensive set of water-efficiency best management practices created to help commercial and institutional facilities manage their water use. Best management practices (BMPs) include:

- Water management planning
- Water use monitoring and education
- Sanitary fixtures and equipment
- Commercial kitchen equipment
- Outdoor water use
- Mechanical systems
- Laboratory and medical equipment
- Onsite alternative water sources



What's Included?

Each section incorporates WaterSense labeled products, water-efficient technologies, and water-saving techniques for both new and existing buildings:

- Overview of each practice or technology
- Operation, maintenance, and user education practices
- Retrofit options
- Replacement options
- Water, energy, and cost savings potential
- Additional resources

6.3 Cooling Towers



Overview

Cooling towers are used in a variety of commercial and institutional applications to remove excess heat. They serve facilities of all sizes, such as office buildings, schools, supermarkets, and large facilities, such as hospitals, office complexes, and university campuses. Cooling towers dissipate heat from recirculating water that is used to cool chillers, air conditioning equipment, or other process equipment. By design, they use significant amounts of water.

Cooling towers often represent the largest use of water in industrial and commercial applications, comprising 20 to 50 percent or more of a facility's total water use. However, facilities can save significant amounts of water by optimizing the operation and maintenance of cooling tower systems.⁴



Cooling towers

Cooling towers work by circulating a stream of water through systems that generate heat as they function. To cool the system, heat is transferred from the system to the water stream. This warm water is then pumped to the top of the cooling tower, where it is sprayed or dripped through internal fill (i.e., a labyrinth-like packing with a large surface area). Fans pull or push air through the tower in a countercurrent, crossflow, or parallel flow to the falling water. As some of the water is evaporated, the heat is removed.⁵ The remaining cooled water is recirculated back through the systems to repeat the process.

The thermal efficiency and longevity of the cooling tower and its associated water loops depend upon the proper management of water recirculated through the tower. Water leaves a cooling tower system in four ways: evaporation, blowdown or bleed-off, drift, and leaks or overflows.

Evaporation

Evaporation is the primary function of the tower and is the method that transfers heat from the cooling tower system to the environment. The quantity of evaporation is not typically targeted for water-efficiency efforts, because it controls the cooling process (although improving the energy efficiency of the systems that use the cooling water will reduce the evaporative load on the towers). The rate of evaporation from a cooling tower is typically equal to approximately 1 percent of the rate of

⁴ North Carolina Department of Environment and Natural Resources, et al. May 2005. *Water Efficiency Manual for Commercial, Industrial and Institutional Facilities*. Page 39. www.watersense.org/brush.htm#p39.

⁵ Ibid.

Table 1-4. Action Plan Water Use Reduction Opportunity Checklist

Water Use Reduction Opportunity/Project	Reference Section	Already Implemented	Evaluate/ Consider	Not Applicable
		4	4	4
Water Use Monitoring and Education				
Read water meters and record monthly water use.	2.2			
Install submeters on any major water-using equipment, systems, or processes.	2.2			
Implement a leak detection and repair program.	2.3			
Educate facility staff, building occupants, employees, and visitors on water management program goals and initiatives.	2.4			
Review, understand, and utilize information in codes, standards, and voluntary programs for water efficiency.	2.5			
Sanitary Fixtures and Equipment				
Replace old tank-type toilets with WaterSense labeled models.	3.2			
Replace old flushometer-valve-type toilets flushing greater than 1.6 gallons per flush (gpf) with high-efficiency models, and install retrofit dual-flush conversion devices on 1.6 gpf flushometer valve toilets.	3.2			
Replace old flushing urinals with WaterSense labeled models.	3.3			
Replace lavatory faucets or faucet aerators (for private use) with WaterSense labeled models and install 0.5 gallons per minute (gpm) faucets or aerators in public-use settings.	3.4			
Replace old showerheads with WaterSense labeled models.	3.5			
Wash only full loads of laundry.	3.6			
Replace old single-load clothes washers with ENERGY STAR qualified models or consider the water factor by purchasing larger or more industrial-sized laundry.	3.6			
Commercial Kitchen Equipment				
Replace old ice machines with ENERGY STAR qualified models.	3.7			
Replace old steam cookers with ENERGY STAR qualified models.	3.7			
Load steam cookers, steam kettles, and combination ovens to capacity.	3.7			
Switch to connectionless combination ovens, steamers, and steam kettles.	3.7			
Replace old water-cooled wok stoves with a model.	3.7			
Install in-line flow restrictor to reduce drip rate to 0.3 gpm.	3.7			

Checklists & Case Studies

Laboratory and Medical Equipment Case Study

To learn how Providence St. Peter Hospital in Olympia, Washington, saved 31 million gallons of water by installing water-efficient laboratory and medical equipment and implementing many additional best management practices described in *WaterSense at Work*, read the case study in Appendix A.



Recognize that reducing water use requires action in every part of an organization

Set goals, prioritize actions, and provide resources to measure, manage and track water use

Management-level

Facility-level

Assess operations and implement efficiency measures

When purchasing, consider product choices – explicit and embedded water use

Products/Supply Chain

Staff

Build awareness & promote behavior change to use water efficiently – internal and customer messaging



Water Management Planning



- Step 1: Making a Commitment
- Step 2: Assessing Facility Water Use
- Step 3: Setting and Communicating Goals
- Step 4: Creating an Action Plan
- Step 5: Implementing the Action Plan
- Step 6: Evaluating Progress
- Step 7: Recognizing Achievement

Aligns with ENERGY STAR's Guidelines for Energy
Management

http://www.energystar.gov/index.cfm?c=business.business_index

Water Management and Planning

look for



- Measure water use with properly installed meters and sub-meters
- Set efficiency goals
- Conduct a facility water audit
- Incorporate water efficiency into procurement language and policies



Monitor Usage and Calculate Savings

- Contact your local water and energy utilities for rebates and incentives for efficient technologies
- Prioritize improvements including O&M, retrofits, and replacements
- Evaluate water and energy efficiency together for the best results
 - Can reduce payback periods and improve ROI





Water Use Education and Sanitary Fixtures



- Water use education
 - Regularly check systems and fixtures for leaks
 - Encourage employees to report leaks and wasted water
 - Educate employees and visitors about how to save water at the point of use
- Sanitary fixtures and equipment
 - Restrooms, lounges, laundry and fitness facilities
 - Choose WaterSense labeled and ENERGY STAR qualified products

Introduction to Water Use Monitoring and Education.....

Metering and Submetering.....

Leak Detection and Repair.....

User Education and Facility Outreach.....

Codes, Standards, and Voluntary Programs for Water Efficiency.....

Introduction to Sanitary Fixtures and Equipment

Toilets

Urinals

Faucets

Showerheads

Laundry Equipment

Commercial Kitchens

Introduction to Commercial Kitchen Equipment.....

Commercial Ice Machines

Combination Ovens

Steam Cookers

Steam Kettles

Wok Stoves

Dipper Wells

Pre-Rinse Spray Valves.....

Food Disposals.....

Commercial Dishwashers.....

Wash-Down Sprayers.....

- Use ENERGY STAR qualified products
 - Dishwashers, ice machines, steam cookers, etc.
- Install efficient pre-rinse spray valves
- Evaluate food disposal systems to avoid continuous water flow
- Monitor steam cooker and steam kettle systems to repair leaks and reuse condensate water





Mechanical Systems



- Eliminate single-pass cooling systems
- Manage heating, cooling, and steam systems
 - Seal and insulate building envelope to reduce load
 - Optimize water use in boilers and cooling towers
 - Maximize cooling tower cycles of concentration
 - Sub-meter cooling tower make-up water to measure evaporation losses
 - Capture and reuse boiler and steam condensate with a recovery system
 - Regularly check for systems for leaks

- Introduction to Mechanical Systems
- Single-Pass Cooling
- Cooling Towers.....
- Chilled Water Systems
- Boiler and Steam Systems.....

Lab and Medical Equipment

- Convert to digital imaging equipment wherever possible
- Eliminate single-pass cooling systems especially in equipment used continuously
- Install full or partial recovery and recirculation systems
- Check systems for leaks regularly
- Turn equipment off when not in use

Introduction to Laboratory and Medical Equipment
Water Purification.....
Vacuum Pumps
Steam Sterilizers
Glassware Washers.....
Fume Hood Filtration and Wash-Down Systems.....
Vivarium Washing and Watering Systems.....
Photographic and X-Ray Equipment.....

Consult local, state, and federal health & safety codes and water quality standards before making modifications



Outdoor Water Use

- Landscaping
 - Use regionally-appropriate plants
 - Avoid planting “strip grass” in areas difficult to maintain
- Irrigation
 - Water wisely with weather- or sensor-based irrigation controllers
 - Install meters to track and measure use
 - Consider alternative water sources for irrigation
- Vehicle Wash Systems
 - Reuse and recycle rinse water

- Introduction to Outdoor Water Use.....
- Landscaping.....
- Irrigation.....
- Commercial Pool and Spa Equipment....
- Vehicle Washing.....

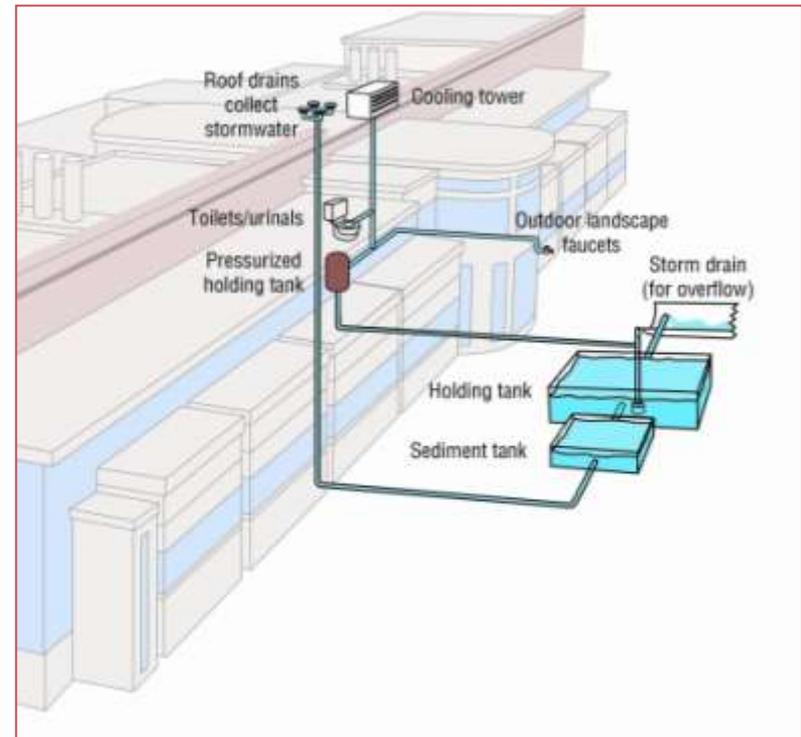


Alternative Water Sources

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- Consider where water can be reused on site as an alternative to potable water – considering possible state/local restrictions
- Potential sources include
 - Rainwater/stormwater
 - Treated gray water
 - Condensate and reject water
 - Cooling equipment blowdown
- Potential uses include
 - Irrigation
 - Toilet/urinal flushing
 - Colling tower make-up



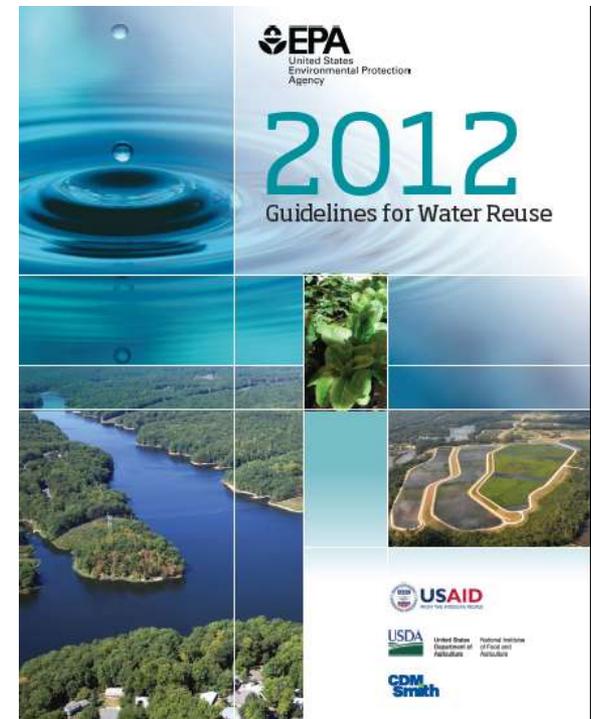
Water Reuse Guidelines

Coming Soon: Updated version for 2012

look for



- Contents
 - Planning and management considerations
 - Types of applications
 - State regulatory programs
 - Regional variations
 - Treatment technologies to protect health and environment
 - Funding reuse systems
 - Public outreach and consultation
 - Global experience in reuse
 - Inventory of recent research projects and reports
 - U.S. and international case studies



WaterSense Resources

- CI Resources – including BMPs and other tools – will be available on WaterSense website

<http://www.epa.gov/watersense/commercial>

- CI businesses and institutions not eligible for WaterSense partnership
- Utilities and other promotional partners can access promotional materials, tools, campaigns, partner webinars and newsletters



WaterSense Information

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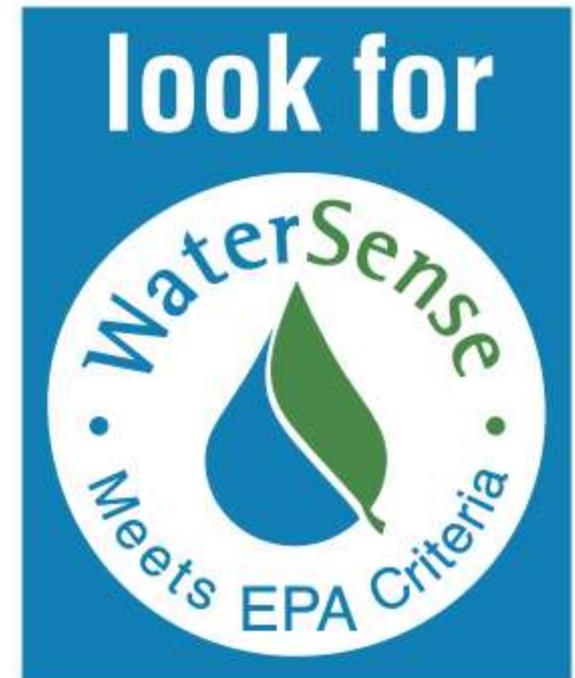
Visit us online!

- www.epa.gov/watersense
- www.facebook.com/epawatersense
- www.twitter.com/epawatersense

Questions?

E-mail: watersense@epa.gov

Helpline: (866) WTR-SENS (987-7367)



Discussion Topics

- Do you currently track water use? In Portfolio Manager? Other System?
- What types of tools or information would serve you best?
- How do we best reach CI customers? BOMA? IFMA? Other?
- Have you recently completed any water efficiency projects that are noteworthy?
- Are there other experiences you want to share?