Just Add Water:
Incorporating Water Efficiency to Take Your Energy Savings to the Next Level

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Tackling WaterSense

WaterSense and ENERGY STAR are hosting a joint webinar series throughout 2016 to help you tackle your facility's water use:

Tackling WaterSense—Sanitary Fixtures & Equipment	***January 28***
Tackling WaterSense—Outdoor Water Use	***March 30***
Tackling WaterSense—Mechanical Systems	***May 10***
Just Add Water: Incorporating Water Efficiency to Take Your Energy Savings to the Next Level	**July 12**
Tackling WaterSense—Commercial Kitchens	**September 20**

Agenda

- Saving Water and Energy
- Conducting a Water Assessment
- Metering and Tracking Water Use
- Calculating a Facility Water Balance
- Water Assessment Tools and Resources
- Questions?

Why Save Water and Energy?

Save operational costs

- Water and sewer rates have risen well above the Consumer Price Index
- Improving system efficiency can reduce maintenance requirements

Water-energy nexus

- Saving water often saves energy and vice versa

Competitive advantage in green marketplace

- More companies are making water conservation a priority

Show sustainability leadership in the community

- Recognition for participating in the ENERGY STAR National Building Competition

EPA

WaterSense Can Help

WaterSense is a voluntary program launched by EPA in 2006 that provides a simple way to identify water-efficient:

- Products
- Programs
- Practices
- Homes

Products are independently certified for water efficiency **and** performance

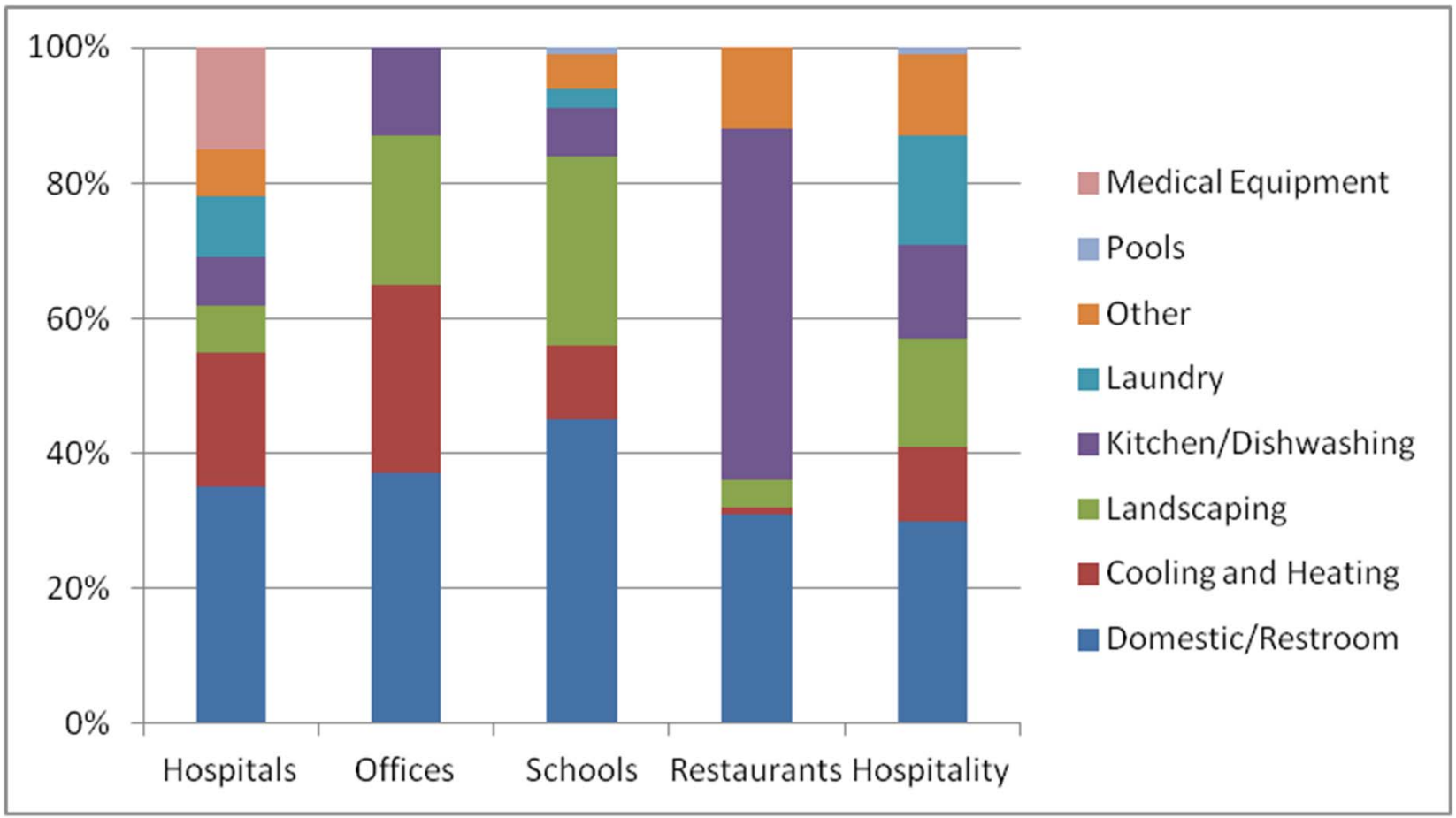
Just Add Water!

Adding water into existing energy efficiency work can help facility managers:

- Understand where and how water is used
- Identify leaks and other operational malfunctions to correct immediately
- Develop and evaluate a comprehensive project list of water savings opportunities

Continued water use tracking helps quickly identify problems

Water Use Profiles of Commercial Facilities



Created by analyzing data from: New Mexico Office of the State Engineer, American Water Works Association (AWWA), AWWA Research Foundation, and East Bay Municipal Utility District

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Steps of Assessing Facility Water Use

Gather information on water sources (metered and unmetered) and collect/review water bills

Establish a baseline using water use data from a typical year

Inventory major water-using fixtures, equipment, systems, and processes

Create a water balance for your facility

Identify projects and opportunities to save water, energy and money

Gather Available Information

Where and how is water being used?

- Identify sources of water
- Identify metered, unmetered, and submetered uses
- Consider additional submetering

Gather and review water bills to understand use and cost

- Collect at least two years of the most recent water and sewer use data
- Gather data to estimate water use from unmetered sources

Sample Water Bill

Water Rates

Wastewater Rates

City Water and Wastewater Bill

Bill Date: October 1, 2012
Due Date: November 1, 2012
Account Number: 987654-32

Customer Name: Facility XYZ
Service Address: 123 Anywhere Lane

Billing Detail:

Water Charges: (a)

Tier 1 – (0-100)	$2.70/ccf	100	$270.00
Tier 2 – (101-250)	$3.10/ccf	150	$465.00
Tier 3 – (251-500)	$3.73/ccf	250	$932.50
Tier 4 – (500+)	$4.13/ccf	50	$206.50
Total Water Charges		**550**	**$1,874.00**

Wastewater (Sewer) Charges: (b)

Sewer Consumption	$6.23/ccf	550	$3,426.50
Total Wastewater Charges		**550**	**$3,426.50**

Other Charges: (c)

Fire Service			$27.33
Stormwater Charge	$104.89/acre	2.1	$220.27
Base/Service Charge			$204.33
Total Other Charges			**$451.93**

Total Charges **$5,752.43**

Summary of Charges:

Previous Balance	$6,221.38
Payment – Thank you	$6,221.38
Water, Wastewater, Other Charges	$5,752.43
Adjustments/Deposits	$0.00
Total Charges	**$5,752.43**

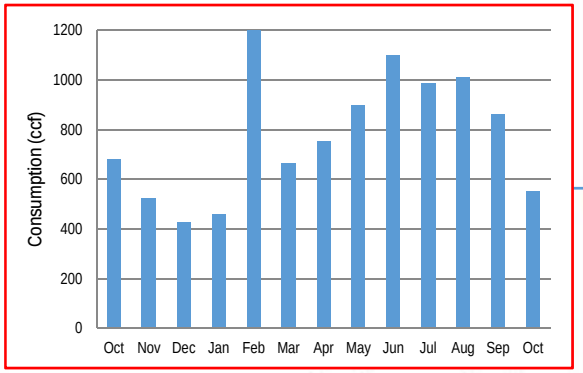
Meter ID: 12345

Current Meter Reading	33,127
Prior Meter Reading	32,681
Water Usage This Period (ccf) (d)	446
Water Usage This Period Last Year	682

Meter ID: 67890

Current Meter Reading	982
Prior Meter Reading	878
Water Usage This Period (ccf)	104
Water Usage This Period Last Year	159

Consumption (e)



Water Use

Water Use Trend

Establish a Baseline

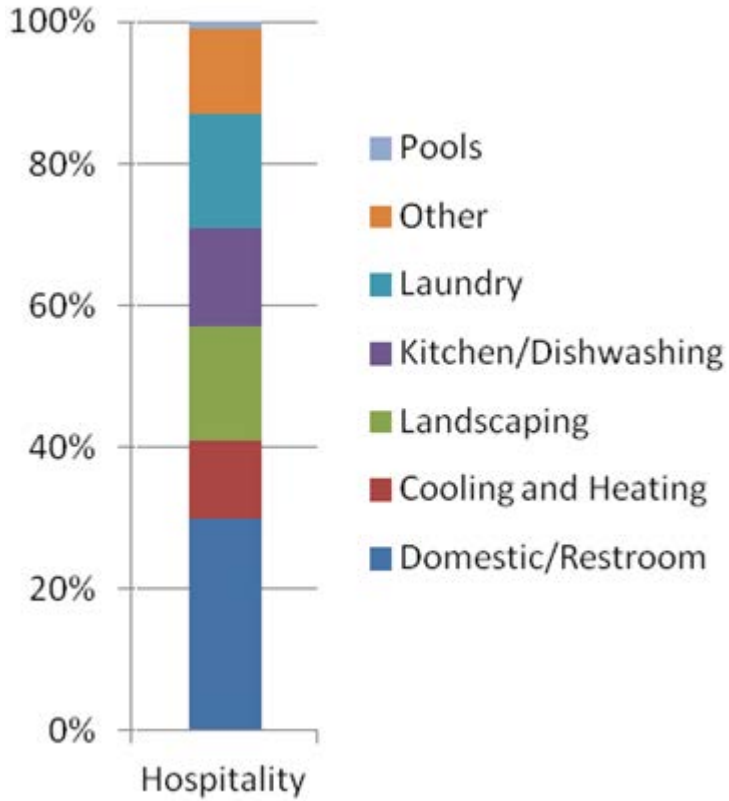
Document water use history

Choose the baseline year

- No major renovations, leaks, or problems

Calculate

- Total annual water use for each metered and unmetered source
- Total annual water use for all sources combined



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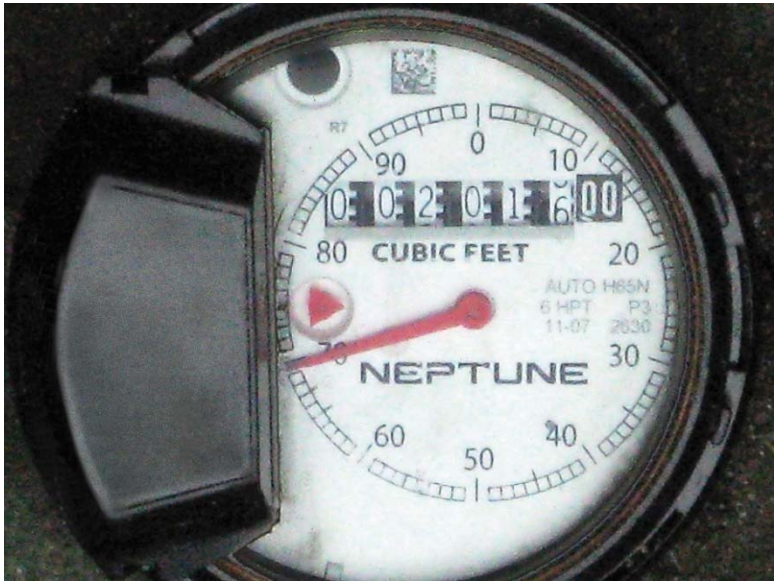
Metering and Submetering

You can't manage what you don't measure!

- Accurately measuring water use can help facilities identify areas for targeted reductions
- Submeters can help identify leaks and equipment inefficiencies or malfunctions



Meter all sources of water

- City potable, reclaimed water

Submeter specific end uses

Submetering Recommendations

Rule of thumb: Submeter any system expected to use more than 1,000 gallons per day or 100,000 gallons per year

- Tenant spaces
- Individual buildings
- Cooling towers (make-up supply line and blowdown line)
- HVAC systems
- Steam boilers
- Single-pass cooling systems
- Irrigation systems
- Roof spray systems
- Ornamental water features
- Pools and spas
- Industrial processes
- Alternative water sources
  - Graywater system
  - Rainwater capture system
  - Air handler condensate collection system

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Metering the Right Way

Choose a meter that is appropriate for the water flow

- Positive displacement meters for small C&I applications
- Compound meters
- Turbine and propeller meters for continuous, high-flow applications
- Select an appropriately-sized meter

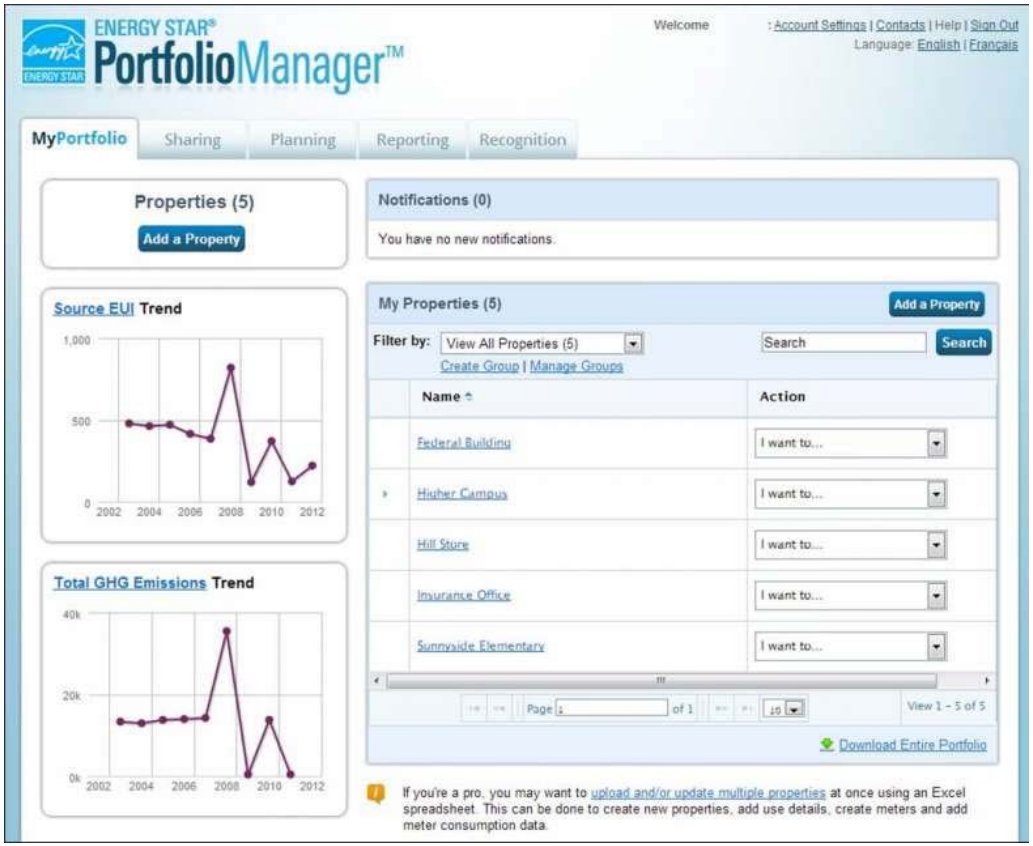
Install and maintain meters correctly

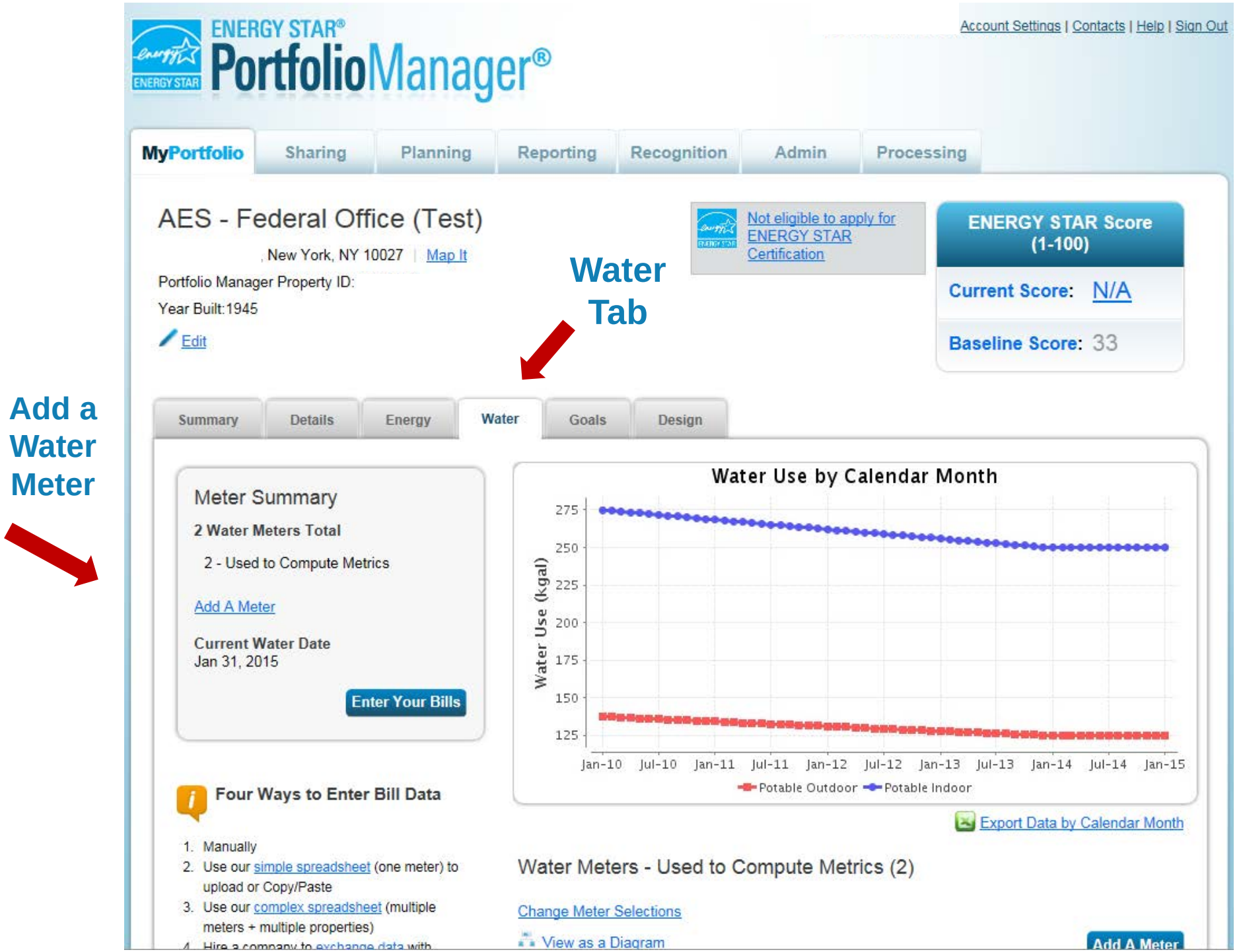
- Install according to manufacturer's instructions in an accessible location away from pipe bends
- Include a strainer on meters and submeters
- Regularly inspect and calibrate meters
- Map installed meters and collect readings during facility rounds

Integrate meters and submeters into centralized building management systems

Tracking Water Use

- Assign responsibility
- Ensure responsible party understands how to read the meter
- Pay special attention to the units that the meter uses (e.g., gallons, cubic feet)
- Plot total water use and submeter data monthly
- Track water usage in ENERGY STAR® Portfolio Manager




ENERGY STAR® PortfolioManager®
Account Settings | Contacts | Help | Sign Out
MyPortfolio
Sharing
Planning
Reporting
Recognition
Admin
Processing
AES - Federal Office (Test)
, New York, NY 10027 | Map It
Portfolio Manager Property ID:
Year Built:1945
Edit
Not eligible to apply for ENERGY STAR Certification
ENERGY STAR Score (1-100)
Current Score: N/A
Baseline Score: 33
Water Tab
Add a Water Meter
Summary
Details
Energy
Water
Goals
Design
Meter Summary
2 Water Meters Total
2 - Used to Compute Metrics
Add A Meter
Current Water Date
Jan 31, 2015
Enter Your Bills
Water Use by Calendar Month
Water Use (kgal)
275
250
225
200
175
150
125
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Potable Outdoor
Potable Indoor
Export Data by Calendar Month
Four Ways to Enter Bill Data
1. Manually
2. Use our simple spreadsheet (one meter) to upload or Copy/Paste
3. Use our complex spreadsheet (multiple meters + multiple properties)
4. Hire a company to exchange data with
Water Meters - Used to Compute Metrics (2)
Change Meter Selections
View as a Diagram
Add A Meter

Get Started Setting Up Meters for AES - Federal Office (Test)

There are four ways to enter meter data. First, you can enter manually, starting below. Second, you can set up your meters below, then upload a specially formatted spreadsheet with just your bill data. Third, for advanced users, you can use our upload tool that allows you to set up all of your meters and enter bill data. And finally, you can hire an organization that exchanges data to update your energy data automatically.

Your Property's Water Usage

What kind of water do you want to track? Please select all that apply.

- [x] Municipally Supplied Potable Water
  - [x] Indoor
    - How Many Meters? 3
  - [x] Outdoor
    - How Many Meters? 1
  - [ ] Mixed Indoor/Outdoor
- [x] Municipally Supplied Reclaimed Water
  - [ ] Indoor
  - [ ] Outdoor
  - [ ] Mixed Indoor/Outdoor
- [x] Alternative Water Generated On Site:
  - [x] Indoor
    - How Many Meters? 1
  - [ ] Outdoor
  - [ ] Mixed Indoor/Outdoor
- [x] Other:
  - [ ] Indoor
  - [ ] Outdoor
  - [ ] Mixed Indoor/Outdoor

Two Meters Needed for Onsite Solar/Wind

If you've got onsite Solar (or Wind), you still need to enter an Electric Grid Meter. Learn More.

Automate Your Meter Entries

If you have a lot of meters, you may want to consider hiring an organization that exchanges data to automatically update your energy consumption. Learn more

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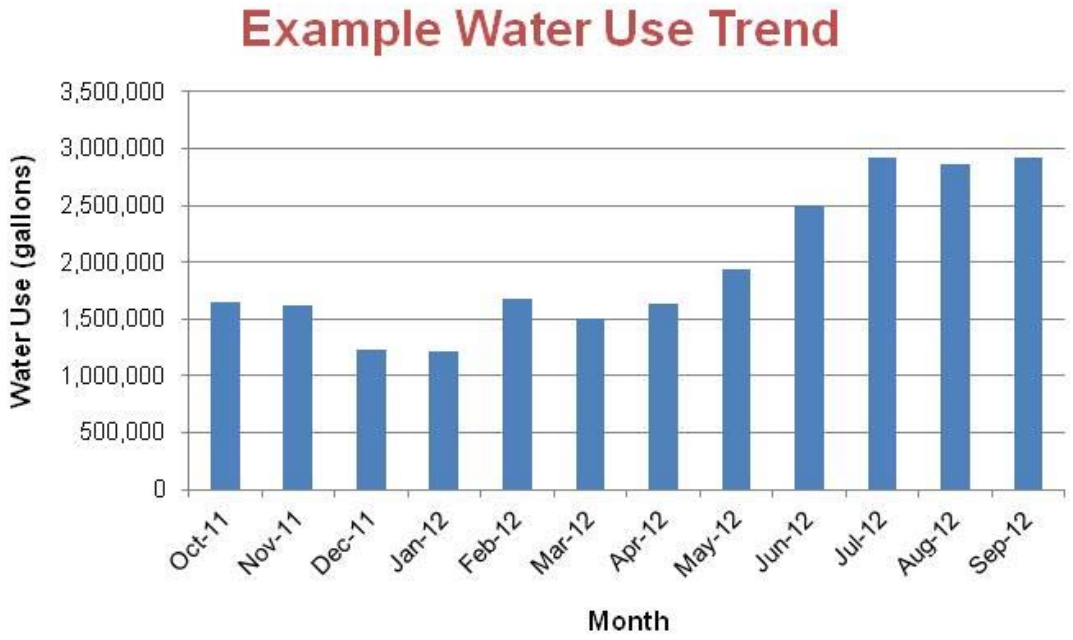
Take a Water Inventory

- Identify major water-using fixtures, equipment, systems, and processes
- Review existing data and plot the trends
- Spikes indicate significant water uses to evaluate first



Take a Water Inventory

Tour the facility where water is used

- Interview personnel
- Capture detailed equipment/fixture info
- Estimate daily water use
- Check drain lines plumbed to floor drains
- Locate water meters

Verify water use when possible

- Manually check flow rate
- Install temporary water meters or flow meters

Tools for Getting Started

Sample Worksheets in Appendix B of *WaterSense at Work*

Building Water Survey, List of Water Meters, Water Consumption History; Equipment and Water Use Inventory

Water Use Savings and Evaluation Tool (WaterUSE Tool) and Worksheets

Excel-based calculator developed for hospitality facilities – other facilities can use it too

Water Assessment Worksheets guide user through process

http://www3.epa.gov/watersense/commercial/tools.html

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Sample Worksheets

Water Use Inventory Worksheet				
Item	**Location**	**Flow (gallons per minute)**	**Operating Time (minutes per day)**	**Flow per Day (gallons per day)**
Lavatory Faucet	1st floor women's restroom	2.0 gpm	50	100

Existing Plumbing Equipment Worksheet									
Use Area	**Location**	**Equipment**	**# of Units**	**Type**	**Mounting (floor/wall)**	**Make/ Model**	**Average Flow Rate or Consumption**	**Average Uses per Week per Unit**	**Comments (leaks, control, etc.)**
Women's Public Restroom	1st Floor	Toilet	5	flushometer valve	wall	XYZ toilet, flushmax	2.0	700	1 unit leaking

Create a Water Balance

Accounts for all water uses at the facility

- For metered or submetered fixtures and equipment, calculate typical annual water use
- For unmetered fixtures and equipment, estimate annual water use from flow rate measurements or equipment specifications and patterns of use

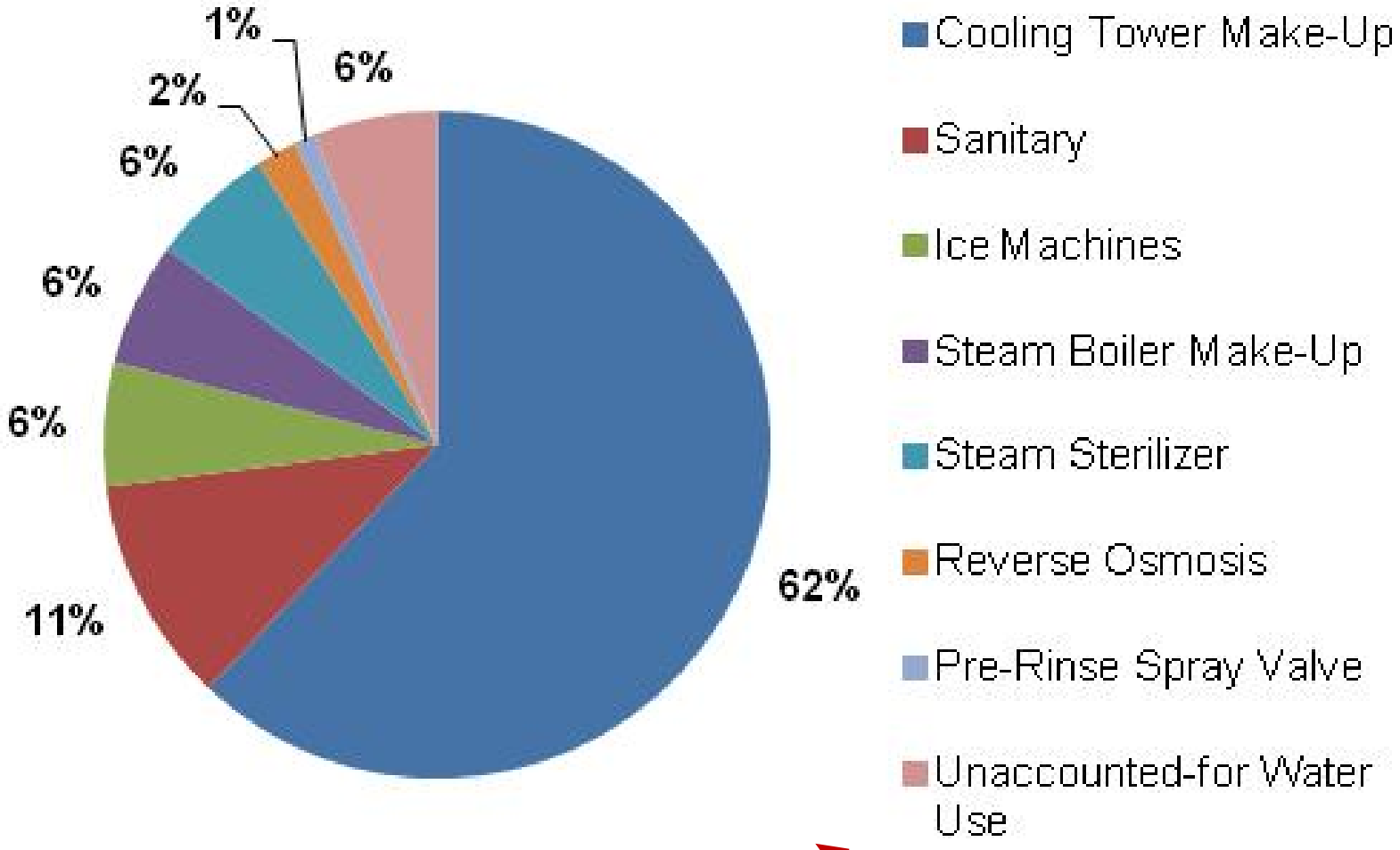
The sum of all metered and estimated end uses should come within 10 percent of the facility's total annual water use

Sample Water Balance

Major Process	Annual Water Use (gallons)	Percent of Total	Basis of Estimate
Total Annual Potable Water Supplied	4,900,000	100	Monthly Water Bills
Use 1: Sanitary (e.g., toilets, urinals, showerheads, faucets)	550,000	11	Engineering estimate of 750,000 gallons per year, subtracting onsite rainwater supply of 200,000 gallons/year
Use 2: Water-Cooled Ice Machine in Commercial Kitchen	300,000	6	Engineering estimate using manufacturer product literature
Use 3: Pre-Rinse Spray Valve	50,000	1	Engineering estimate
Use 4: Steam Sterilizer (i.e., continuous discharge tempering water)	300,000	6	Instantaneous flow rate measurement
Use 5: Reverse Osmosis Supply	100,000	2	Metered
Use 6: Cooling Tower Make-Up Water	3,000,000	62	Metered
Use 7: Steam Boiler Make-Up Water	300,000	6	Metered
Sum of Accounted-for Potable Water Use	4,600,000	94	Summed from uses 1 through 7
Unaccounted-for Potable Water Use	300,000	6	Calculated by difference from total water use and accounted for water use (since this is less than 10 percent, the facility likely does not have a significant leak)

Potential Water Waste

Example Water Balance



Potential Water Waste

Curb Water Waste

Start with leaks - the greatest source of water waste within a facility ~ 6 percent of water use

Leaking or continuously running water has no added value

- Facilities pay for water twice so water waste is costly
  = water supplied + water discharged to the sewer
- Plumbing products usually fail open and leak, unlike energy products that just stop working

Repair leaks and continuously flowing fixtures ASAP

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Leak Detection

Monitoring

- Read meters during off-peak hours
- Compare monthly readings
- Account for seasonal water use

Detection

- Install leak detection systems
- Failure abatement devices

Look and listen

- Dripping or flowing water in mechanical spaces
- Discharge to floor drains
- Running restroom fixtures
- Puddling outdoors

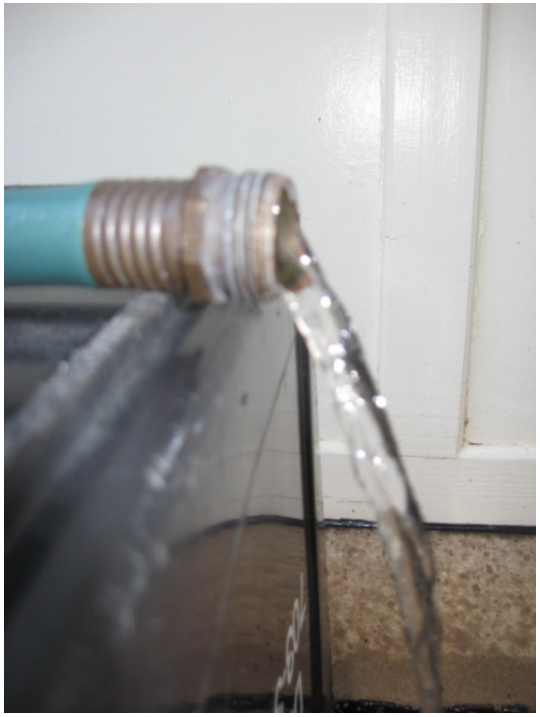
Call to Action

Train custodial staff to identify and fix leaking or malfunctioning fixtures and equipment

Post signage in restrooms and kitchen areas with:

- water saving factoid or call to action
- contact info for repairs

Flow Rate Visuals



1 gpm

500,000 gal/year

$4,415/year*

2 gpm

1,000,000 gal/year

$8,830/year*

6 gpm

3,000,000 gal/year

$26,490/year*

*at national average commercial cost of $8.83 per 1,000 gallons

Potential Losses From Water Leaks

Malfunction	Leaking Flow Rate (gpm)	Water Loss	Estimated Cost of Water Loss
Leaking Toilet	0.5 gpm	21,600 gallons per month	$2,100 per year
Drip Irrigation Malfunction	1.0 gpm	43,200 gallons per month	$4,300 per year
Unattended Water Hose at Night	10.0 gpm	5,400 gallons per day	$16,000 per year
Broken Distribution Line For: One Night One Day One Week One Month	 15.0 gpm 15.0 gpm 15.0 gpm 15.0 gpm	 8,100 gallons 21,600 gallons 151,200 gallons 648,000 gallons	Up to $64,000 per year
Tempering Water Line on a Steam Sterilizer Stuck in the On Position	2.0 gpm	86,400 gallons per month	$8,600 per year
Stuck Float Valve in a Cooling Tower	5.0 gpm	216,000 gallon per month	$21,000 per year

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WaterSense Resources

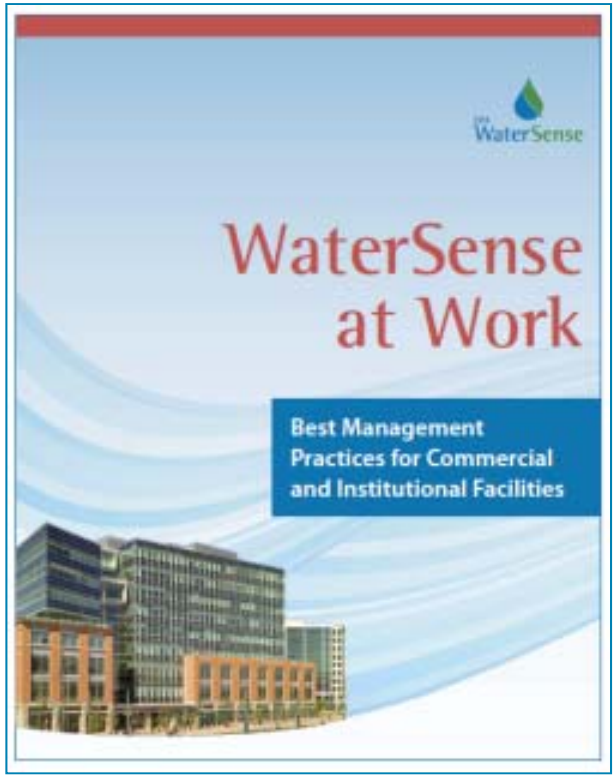
- Water use information by facility type
- Best management practices
- Water-saving tips
- Assessment tools
- Worksheets and checklists
- Live and recorded training webinars
- Case studies and more!

www.epa.gov/watersense/commercial/tools.html

Best Management Practices

WaterSense at Work is an online guide facilities can use to manage water use:

- 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 sources of water



EPA WaterSense

Simple Water Assessment Checklist

Water-efficient Project or Practice	Section of *WaterSense at Work*[1]	Evaluate ✓	Implement ✓	Done ✓
10. Educate employees to turn off equipment including all continuous flow equipment, between uses; use automatic shut-off valves where applicable.	—			
11. **Educate employees to use "dry" cleaning methods to avoid washing down equipment or areas with a water hose or mop; sweep or mop instead of spray washing with water.**	—			
12. Test water pressure regularly on each floor of the facility to ensure it is within optimal range for fixture and equipment performance; use pressure regulating valves to correct any issues (i.e., optimal pressure is between 20 and 80 psi for most fixtures).	—			
Sanitary Fixtures and Equipment				
13. Regularly check all fixtures and valves for scaling and clean as needed.	3.2 - 3.5			
14. Test and calibrate all automatic- and sensor-flushing devices regularly to prevent double/phantom flushes.	3.2 - 3.3			
15. Check tank-type toilets for leaks, broken flappers, and other parts failures regularly.	3.2			
16. Install retrofit dual-flush conversion devices on 1.6-gallon per flush (gpf) flushometer-valve toilets.	3.2			
17. **Display instructional signage with all dual-flush devices to ensure proper use.**	3.2			
18. Replace old tank-type and flushometer-valve toilets with WaterSense labeled models, which flush at 1.28 gpf or less.	3.2			

Water Use and Savings Evaluation (WaterUSE) Tool

Identify water-saving changes

- Estimates water use from each end use area
- Potential water-efficient fixture/equipment retrofit or replacement projects
- Specific BMPs to reduce water and energy use

Calculates potential savings using customizable project costs

- Estimated water, energy, and cost savings from the changes
- Estimated project payback period

WaterUSE Tool - Summary of Potential Water-Efficiency Projects and Best Management Practices

This tab provides a summary of all of the potential water, energy, and cost savings and/or recommended best management practices identified based on the information you entered water use area. The tab automatically updates as information is entered or changed and can be used to help you prioritize water efficiency projects and practices to save your hotel w energy, and money.

Potential Water Savings and Payback Period from Restroom, Guest Ice and Laundry, and Dishwashing Projects

	Number of Fixtures to Replace	Estimated Project Cost ($)	Potential Annual Water Savings (gal)	Potential Annual Energy Savings -	Potential Annual Energy Savings -	Total Annual Cost Savings ($)	Potential Payback Period (years)
Guest Rooms							
Tank-Type Toilets	200	$60,000	698,000	—	—	$8,400	7.1
Faucets	200	$2,000	756,000	—	480	$4,943,500	0.0
Showerheads	200	$4,000	510,000	—	330	$3,398,540	0.0
Guest Rooms Total	**600**	**$66,000**	**1,964,000**	—	**810**	**$8,350,440**	**0.0**
Public Restrooms							
Flushometer-Valve Toile	30	$30,000	161,000	—	—	$1,940	15.5
Urinals	15	$7,500	54,000	—	—	$650	11.5
Faucets	50	$500	108,000	—	70	$720,900	0.0
Showerheads	10	$200	18,200	—	10	**$103,020**	0.0
Public Restrooms Total	**105**	**$38,200**	**341,200**	—	**80**	**$826,510**	**0.0**
Guest Ice and Laundry Total	Not Estimated	Not Estimated	Not Estimated	Not Estimated	Not Estimated	Not Estimated	Not Estimated
Dishwashing Total	Not Estimated	Not Estimated	Not Estimated	Not Estimated	Not Estimated	Not Estimated	Not Estimated
GRAND TOTAL	**705**	**$104,200**	**2,305,200**	Not Estimated	**890**	**$9,176,950**	**0.0**

Recommended Best Management Practices for Linen Laundry

» Because you indicated that your hotel already has a towel and linen reuse program and does not have in-house laundry equipment, there are no best management practice recommendations for this water use area.

Recommended Best Management Practices for Commercial Kitchens

Other Assessment Resources

City of Boulder Commercial, Industrial, and Institutional (CII) Water Assessment Tool and User's Guide – based on WaterSense at Work

http://www.brendlegroup.com/water/cii-water-assessment-tool

South Florida Water Management District *Water Efficiency and Self-Conducted Water Audits at Commercial and Institutional Facilities Guide*

http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/water_efficiency_improvement_self_assess_guide.pdf

Environmental Defense Fund, AT&T, & GEMI

Water Efficiency Toolkit with Scorecard and WaterMAPP Tool
http://business.edf.org/projects/featured/water-efficiency-and-att/water-efficiency-toolkit-2/

DOE Federal Energy Management Program Water Project Screening Tool -
http://energy.gov/eere/femp/downloads/water-project-screening-tool

What You Can Do Right Now

- Start collecting your water bills and identify existing meter locations
- Identify additional areas or systems for submeters
- Educate employees to look for and report leaks and fix them immediately
- Conduct water use inventory of equipment and appliances
- Create a list of potential projects and contact utilities to see if rebates and incentives are available

Just 90 days to whip your buildings into shape!

- Compete to reduce energy & water use over a 90 day period
- Register up to 5 buildings to keep your efforts focused
- Earn EPA recognition for slimming your energy or water "wastelines"
- Use tailored ENERGY STAR toolkits to engage & motivate employees, staff, and occupants

Key Dates

- Register: May 17 - July 17, 2016
- Compete: September 1 – November 30, 2016
- Winners announced in early 2017

EPA

Learn more and follow along at www.energystar.gov/battleofthebuildings

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Recorded and upcoming webinars:

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www.epa.gov/watersense/commercial/webinars.html

Contact Us

ENERGY STAR

For technical questions related to Portfolio Manager or the ENERGY STAR program, please visit:

www.energystar.gov/buildingshelp

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