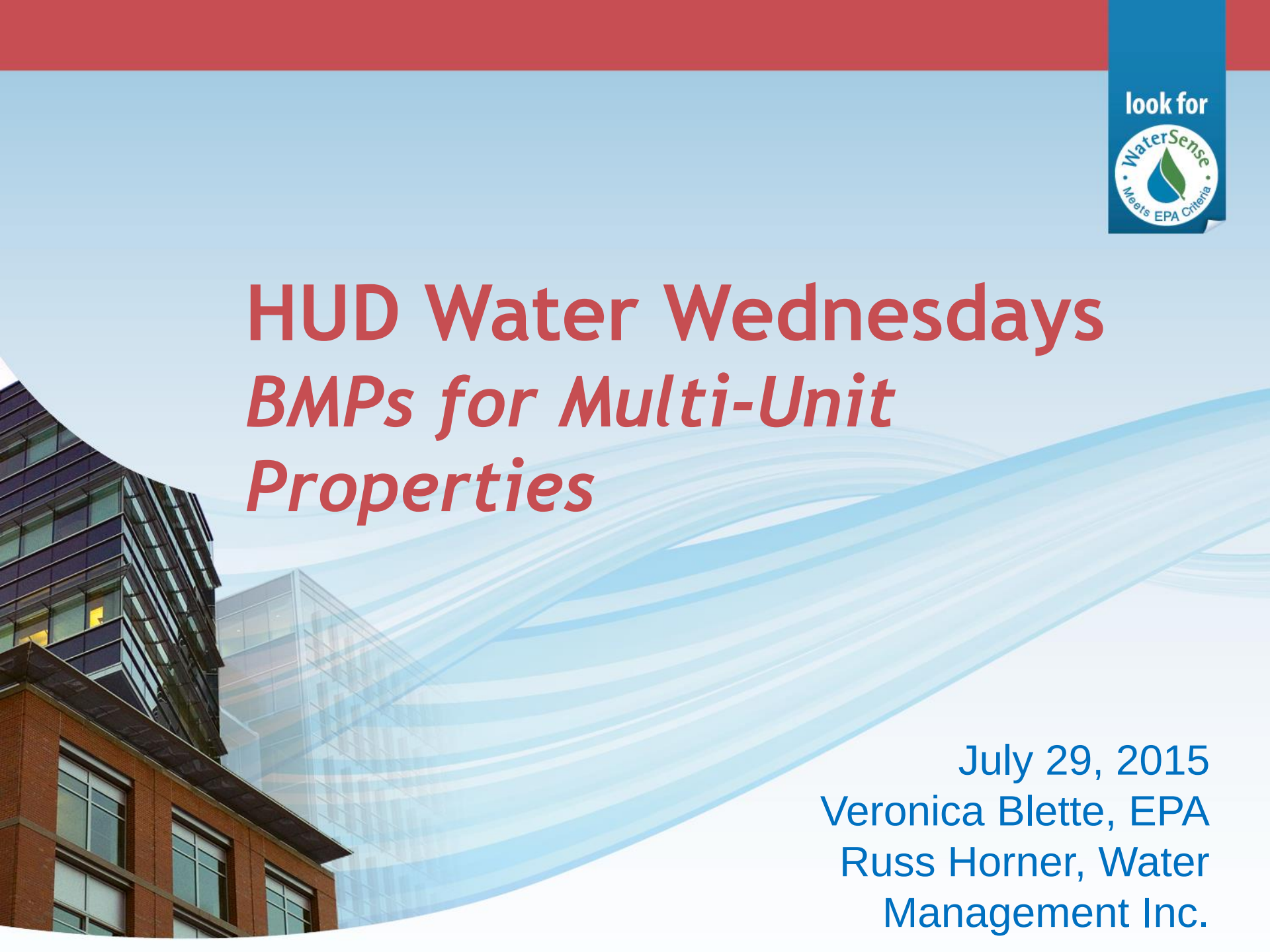


HUD Water Wednesdays

BMPs for Multi-Unit Properties

July 29, 2015

Veronica Blette, EPA
Russ Horner, Water Management Inc.

Housekeeping

- All attendees are muted to minimize background noise.
- Please type questions into the questions/chat box in your GoToWebinar panel. We will have a dedicated time for Q&A.
- A recording of this presentation will be posted on the WaterSense website at http://epa.gov/watersense/hudwebinars

Poll Question

- Have we met?
  - Yes, I attended one of the earlier live webinars.
  - Kind of, I watched one of the recorded webinars.
  - No, this is my first time!

Today's Presenters

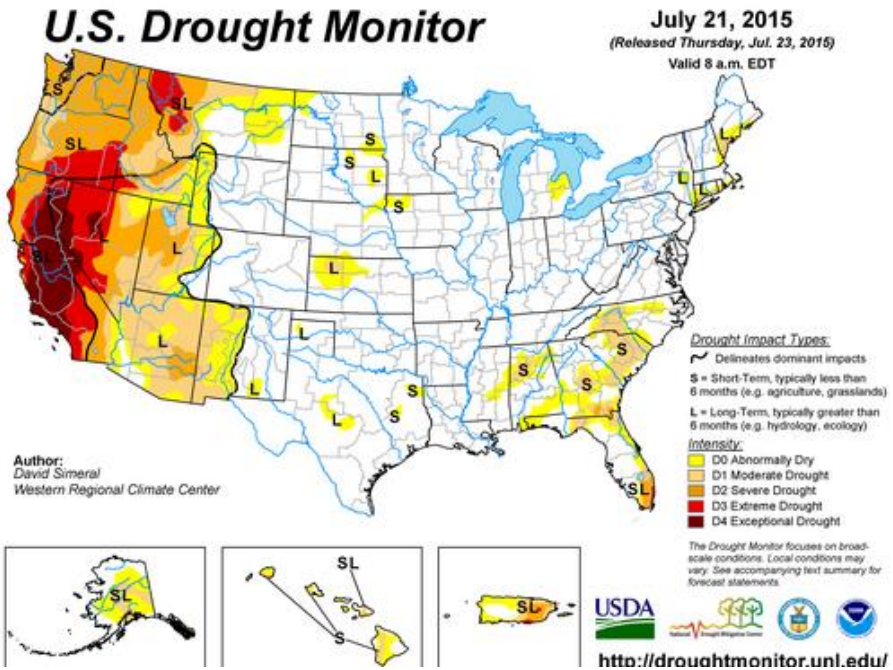
- **Veronica Blette,** Chief, WaterSense Branch

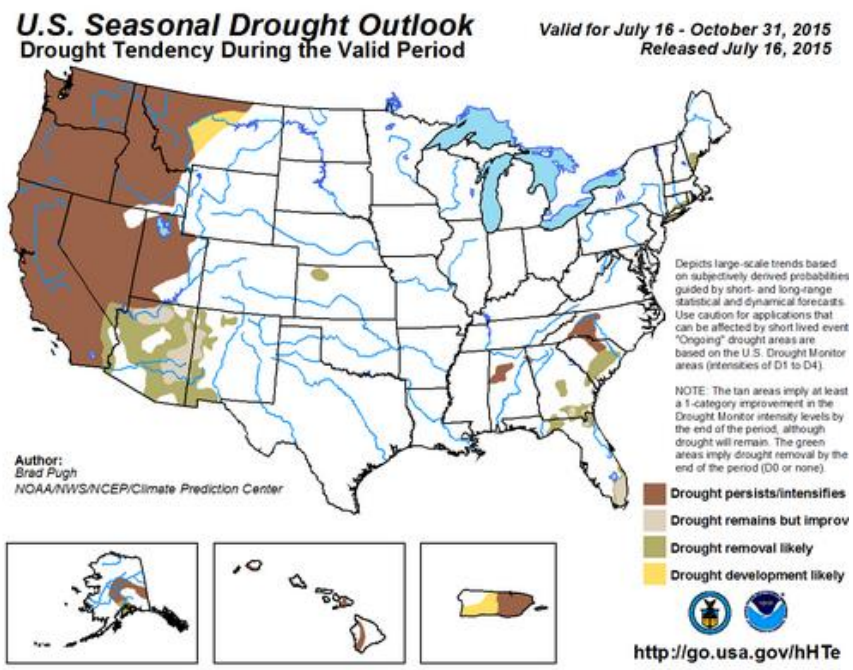
- **Russ Horner,** President, Water Management, Inc.

The Bigger Picture

- Federal Requirements
- Energy/Water Nexus
- Costs
- Water Use
- Weather and Climate
- The Opportunity

Current Newsworthy Driver





Current Picture

July – October outlook

EPA and WaterSense – the why and what

Water shortages expected in 36 states

Communities face major infrastructure investments

Consumers challenged by rising utility bills

Much of water used outdoors is wasted

No ENERGY STAR-like program for water

2006

look for WaterSense Meets EPA Criteria

Identify high-performing technology

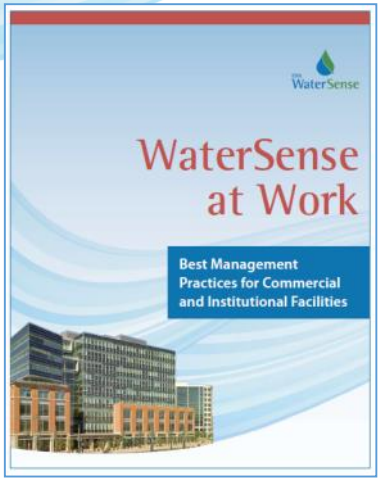
Promote water efficient behavior/action

Help consumers save money

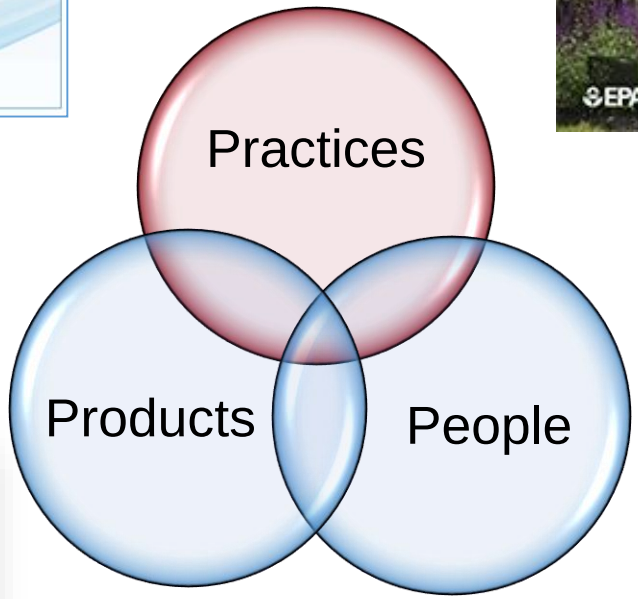
Reduce need to expand infrastructure capacity

Save water for critical needs

WaterSense Approaches



Actions that can be taken to reduce water use -- at home, outdoors and at work



Specific fixtures and technologies save water

Partners reach users to change behavior

What we have covered to date

- Webinar 1 - How to identify water-efficient WaterSense labeled products and purchase them through the Quantity Quotes bulk purchasing platform

QuantityQuotes
Connecting buyers with suppliers of green and energy-efficient products

- Webinar 2 - How to communicate with residents about water efficiency

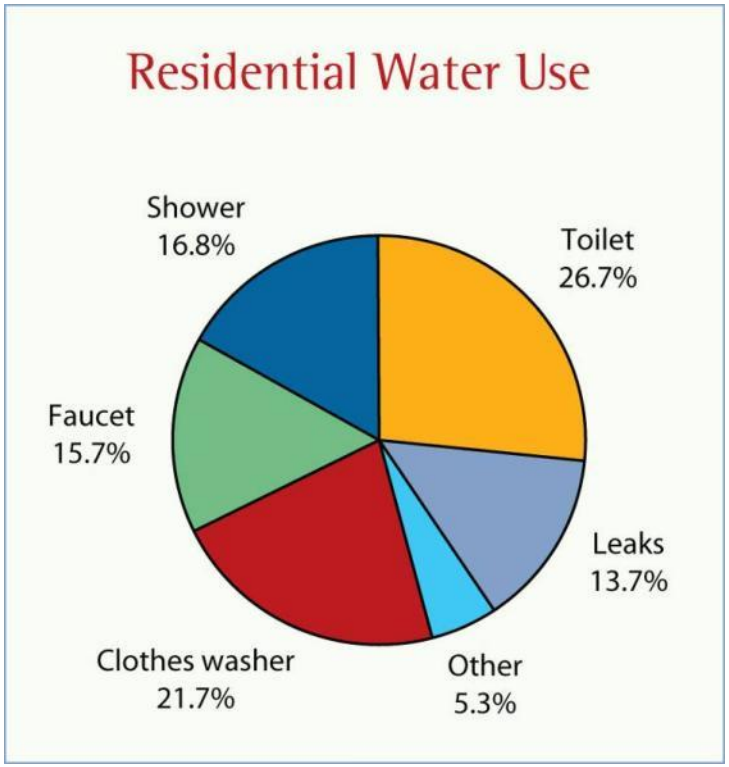
Fix a Leak Week

- Webinar 3 – How to build more water efficient housing using WaterSense and LEED criteria

Water use in the home?

- We don't have a study that looks specifically at multi-family, but can assume somewhat similar to single family.
- Toilets, faucets, showers, clothes washers, and leaks are biggest indoor users.
- In previous webinars, we've talked about savings afforded by WaterSense and ENERGY STAR certified products.

Indoor Use

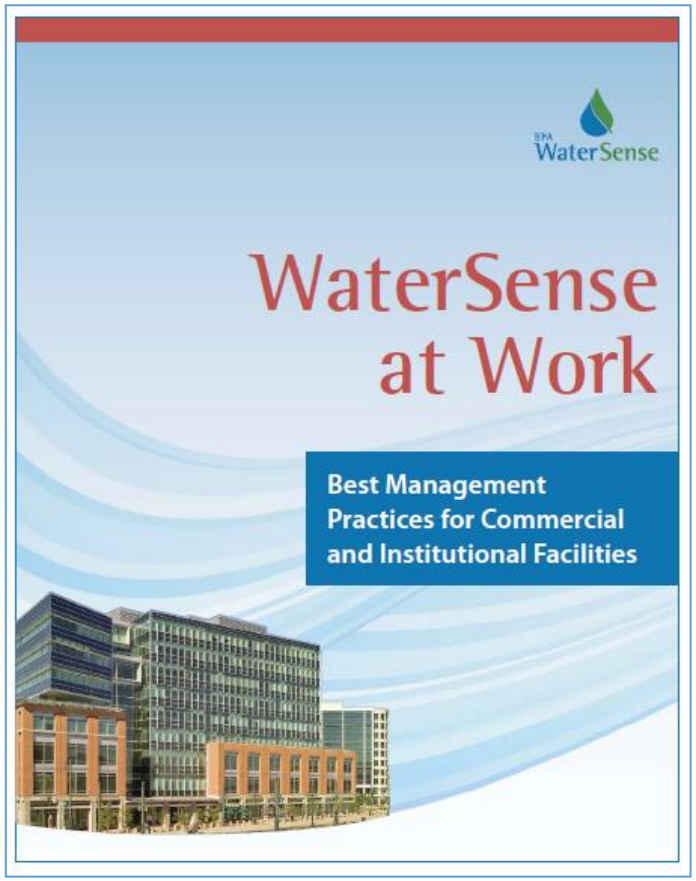


1999 Residential End Use Study

Today's Focus? Property-Wide BMPs

- Multi-unit properties come in a variety of shapes and sizes
  - Low rise garden-style to high rise
  - No common areas to extensive landscaped areas
  - Possible mixed-use w/commercial space
  - Central vs. distributed heat/AC/hot water
- The BMPs on which a property manager focuses are specific to the type of facility managed

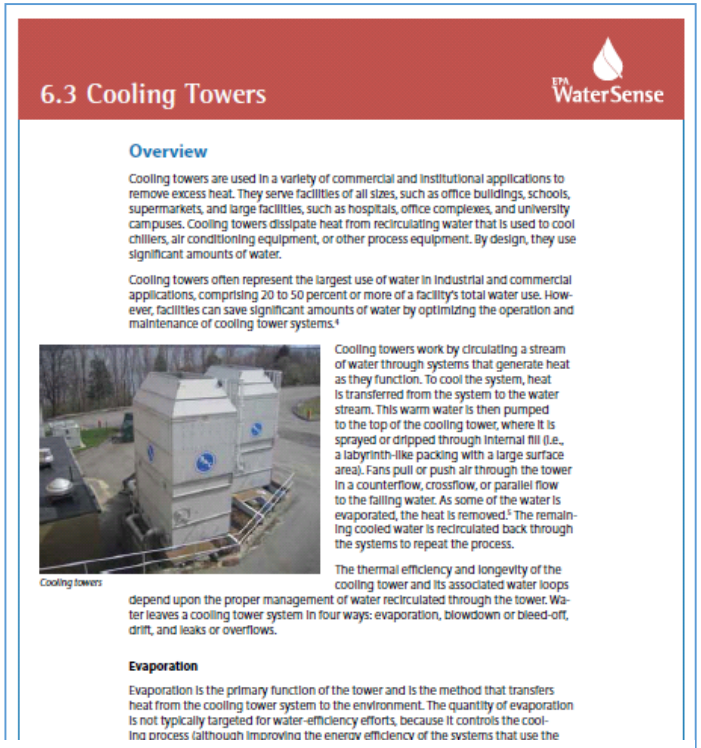
Water Efficiency Best Management Practices



- Released in November 2012
  - 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

Water Efficiency Best Management Practices

- Each of 36 BMPs provides:
  - An overview of the technology
  - Operation, maintenance, and user education tips
  - Retrofit and replacement options
  - Calculations for potential water, energy, and dollar savings and payback
- 7 case studies outline success stories in major BMP areas
- Checklists to help track actions



6.3 Cooling Towers

EPA WaterSense

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 counterflow, 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

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			

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

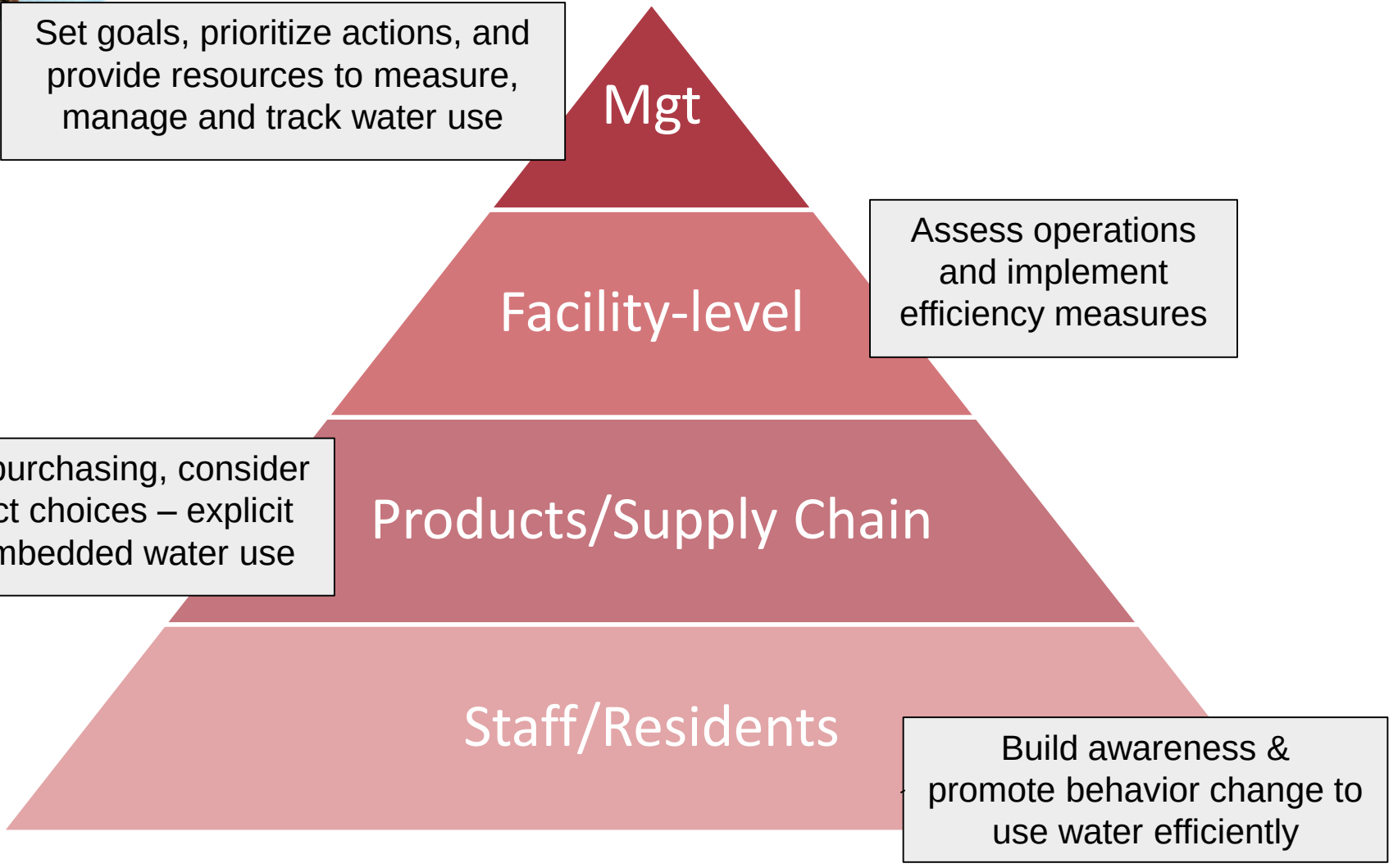
Step 7: Recognizing Achievement

Aligns with ENERGY STAR's Guidelines for Energy Management…so can "just add water" to programs
http://www.energystar.gov/buildings

Need All Hands on Deck

look for WaterSense Meets EPA Criteria

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



Assess operations and implement efficiency measures

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

Build awareness & promote behavior change to use water efficiently

Tips to Consider when Getting Started

- Measure water use with properly installed meters and sub-meters
- Conduct a facility water audit
- Set efficiency goals
- Track water usage in Portfolio Manager
- Identify and implement water efficiency projects – investigate possible incentive programs
- Incorporate water efficiency into procurement language and policies
- Remember to evaluate water and energy efficiency together

Create 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)**

Mechanical Systems

- Eliminate single-pass cooling systems
- Regularly check for systems for leaks
- 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

Outdoor Water BMPs

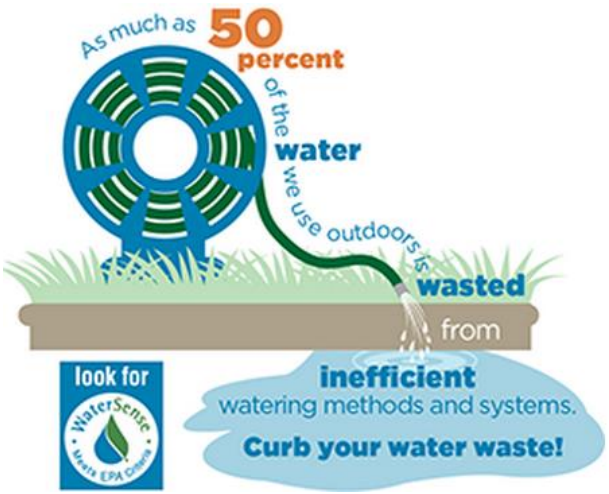
- Landscaping
  - Use regionally-appropriate plants
  - Avoid planting “strip grass” in areas difficult to maintain
- Irrigation
  - Water wisely with weather- or sensor-based irrigation controllers
  - Install meters to track and measure use
  - Consider alternative water sources for irrigation
- Pools
  - Use covers to reduce evaporation
  - Minimize splashing by setting water level below edge
  - Keep filters clean and maintain chemistry
  - Actively monitor for leaks

Landscaping Tips

- A well-designed, healthy, water-efficient landscape includes:
  - Healthy soils to promote water infiltration and root growth
  - Appropriate grading with gentle slopes to minimize runoff
  - Mulching of landscaped beds to keep soils cool and moist
  - Drought-tolerant, native, or climate/regionally-appropriate plant species
  - Hydrozoning – group plants that have similar water needs
  - Turfgrass limited to functional areas and raise mower blade

Irrigation Tips

- Irrigation water waste due to wind, evaporation, and over-watering can be reduced by:
  - Better irrigation system design and proper installation
  - Better maintenance of the system
  - Proper scheduling and smart controllers
  - Consider low-flow, low volume spray heads or drip irrigation
- Consider using the WaterSense water budget tool to get an idea of how landscape design and irrigation choices affect the amount of water you may need



Using the Water Budget Tool to Evaluate Landscape Design

look for WaterSense Meets EPA Criteria

STEP 1 Location and Area | STEP 2 Plants and Irrigation | STEP 3 The Results

Fill out the chart below with all the appropriate information to calculate your landscape's water needs.

Zone	Area (sq. ft.)	Plant Type / Landscape Feature	Water Demand	Irrigation Type	Impact on Water Use	Required Water (gal/month)
× 1	10000	Nonvegetated Softscape	NA	NA		0
× 2	10000	Permeable Hardscape	NA	NA		0
× 3	10000	Turfgrass	Low	Rotor	💧💧💧💧💧💧💧💧💧	35208
× 4	10000	Groundcover	Low	Drip (Standard)	💧💧💧	11736
× 5	10000	Trees	NA	No Irrigation		0
× 6						

Total: **50000**

\+ add zone

0	143,764	46,944	96,820
Remaining Area (sq. ft.)	Water Allowance (gal/month)	Total Water Requirement for the Site (gal/month)	Below Allowance (gal/month)

NEXT STEP >

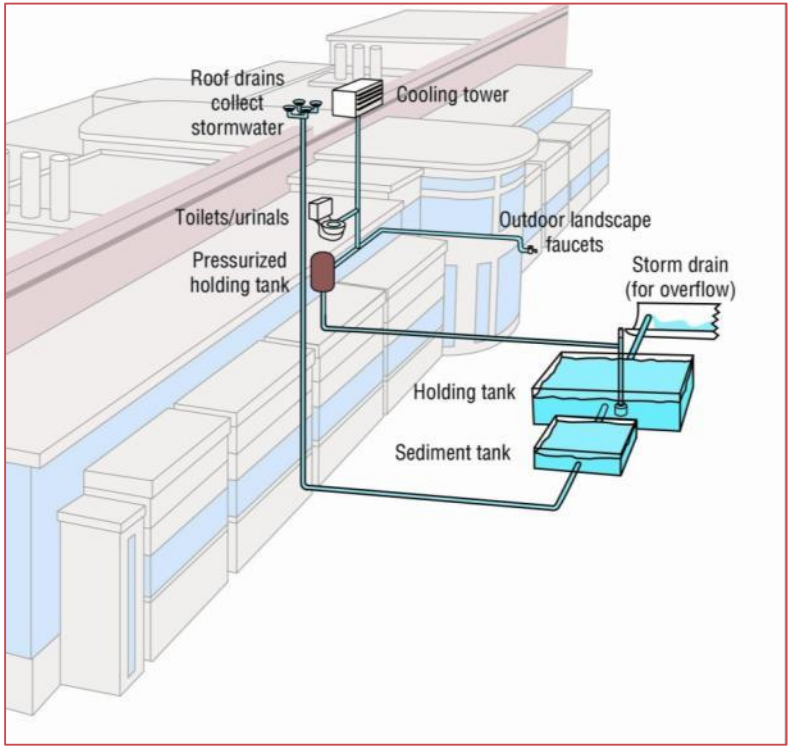
http://www.epa.gov/watersense/water_budget

Alternative Water Sources

- 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
  - Cooling tower make-up



Poll Question

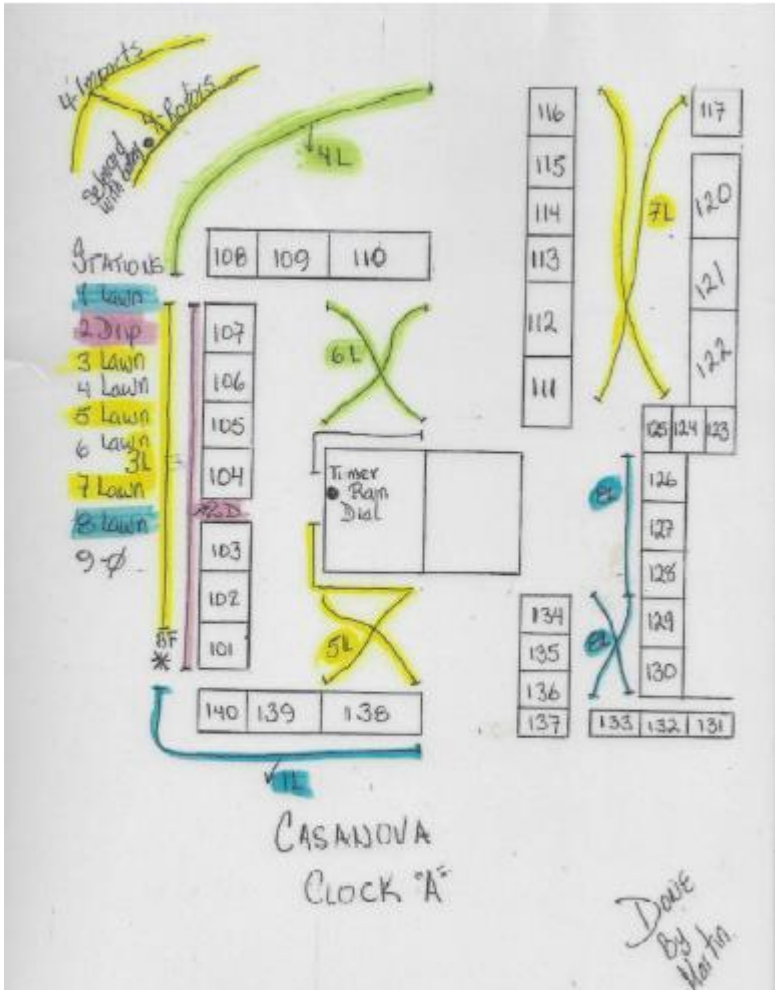
- What have you done to address outdoor water use? (choose all that apply)
  - Nothing, I don't have any landscapes on my property.
  - Nothing yet, but I plan to do something in the future.
  - I've changed my landscape to use plants that need less water.
  - I've changed my watering habits – to water less frequently or use a smart controller.
  - I've ripped out my turf and/or stopped using my irrigation system.

Success Story - *Alameda Housing Authority (CA)*

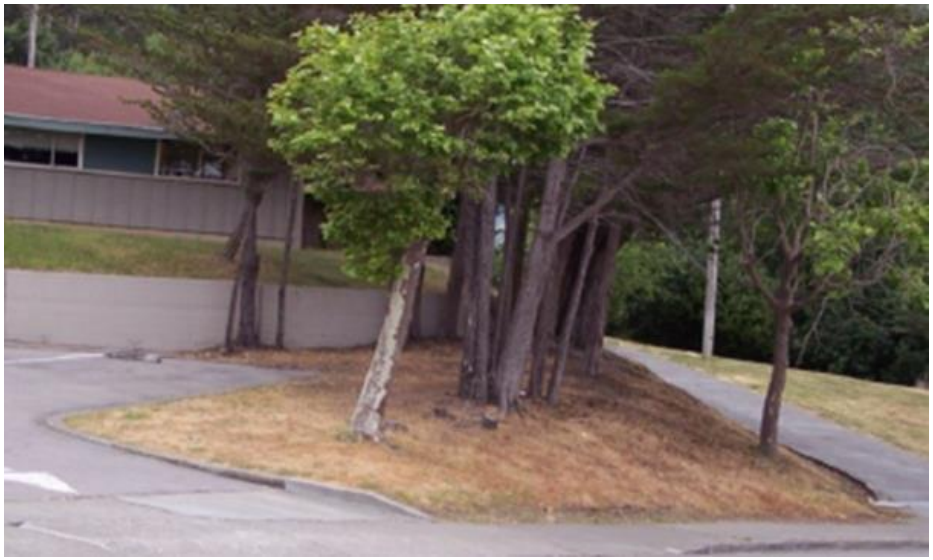
- **Monitoring** – reviewed bills for the 572 units to establish a baseline to monitor and manage future use and savings.
- **Maintaining** – worked with local utility to get test kits to check toilets for “silent leaks”. Installing new toilets and aerators when needed.
- **Educating** – staff have given four presentations at largest properties to share tips and ask that residents strive to use only 35 gallons per day per person.
- **Landscaping** – converting to “Bay Friendly” landscapes. Removing turf and switching to native species has saved >1 million gallons in last 12 months.

Marin County Housing

Marin County Housing



Marin County Housing



Marin County Housing

Marin County Housing

Conservation Corps

Employment

Learn job skills and employment training.

Conservation

Work outdoors protecting beautiful places.

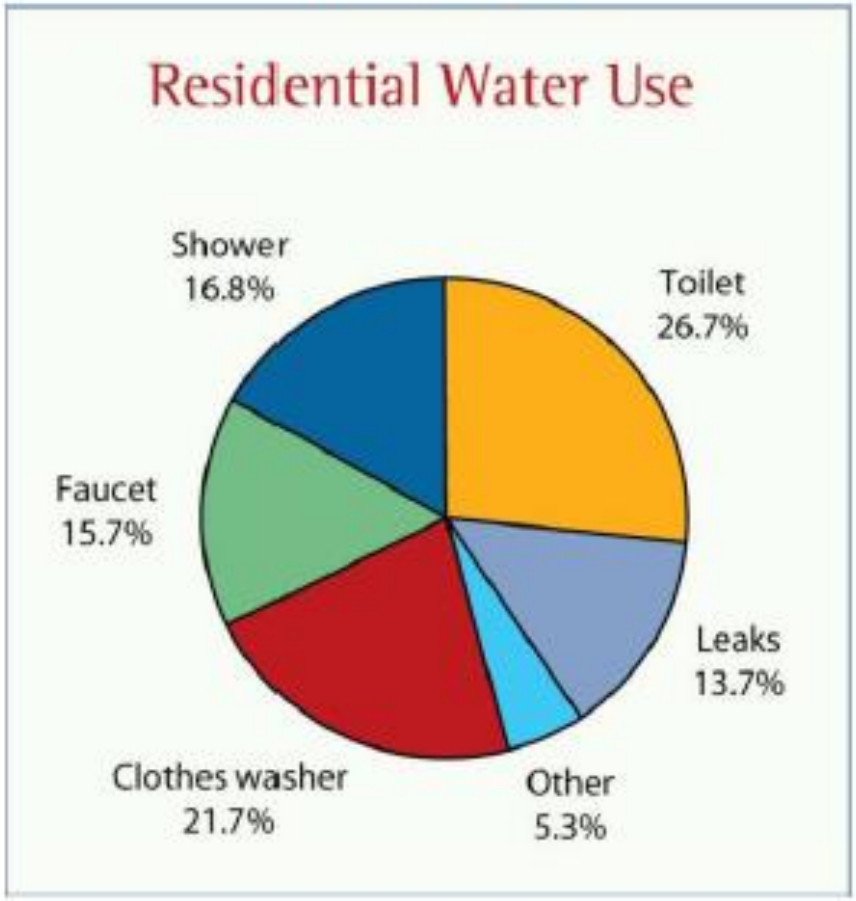
Through engaging young people in service projects that address important environmental and community issues, Corps tackle some of America's greatest challenges.

Green Roofs

Water Harvesting

Do you remember this slide?

Indoor Use



1999 Residential End Use Study

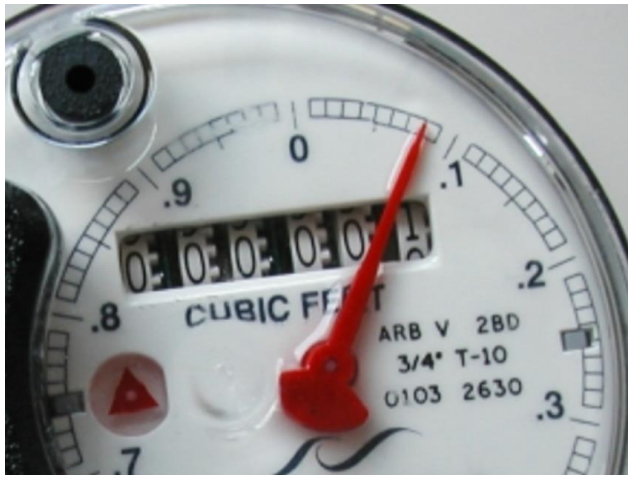
Target water usage in gallons per person per day used to be 70 gallons.

Target Calculations	GPD
Target with fixtures pre 1995	70
Target with fixtures 1995 - 2004	55
Target with WaterSense	43

2011 End Use Analysis - Single Family Home

End Use	REUWS (Homes built before 1995) (gphd)	Standard New Homes (Homes built after 2001) (gphd)	High-efficiency New Homes (gphd)
Toilet	45.2	27.52	**16.2**
Clothes washer	39.2	28.91	**11.9**
Shower	30.8	29.88	**34.3**
Faucet	26.7	25.23	**18.1**
Leak	21.9	19.66	**19.2**
Other	7.4	3.02	**0.9**
Bathtub	3.2	3.45	**7.1**
Dishwasher	2.5	1.94	**1.9**
Total Daily Indoor Use	177	140	110

Analyzing daily or hourly water usage used to be difficult



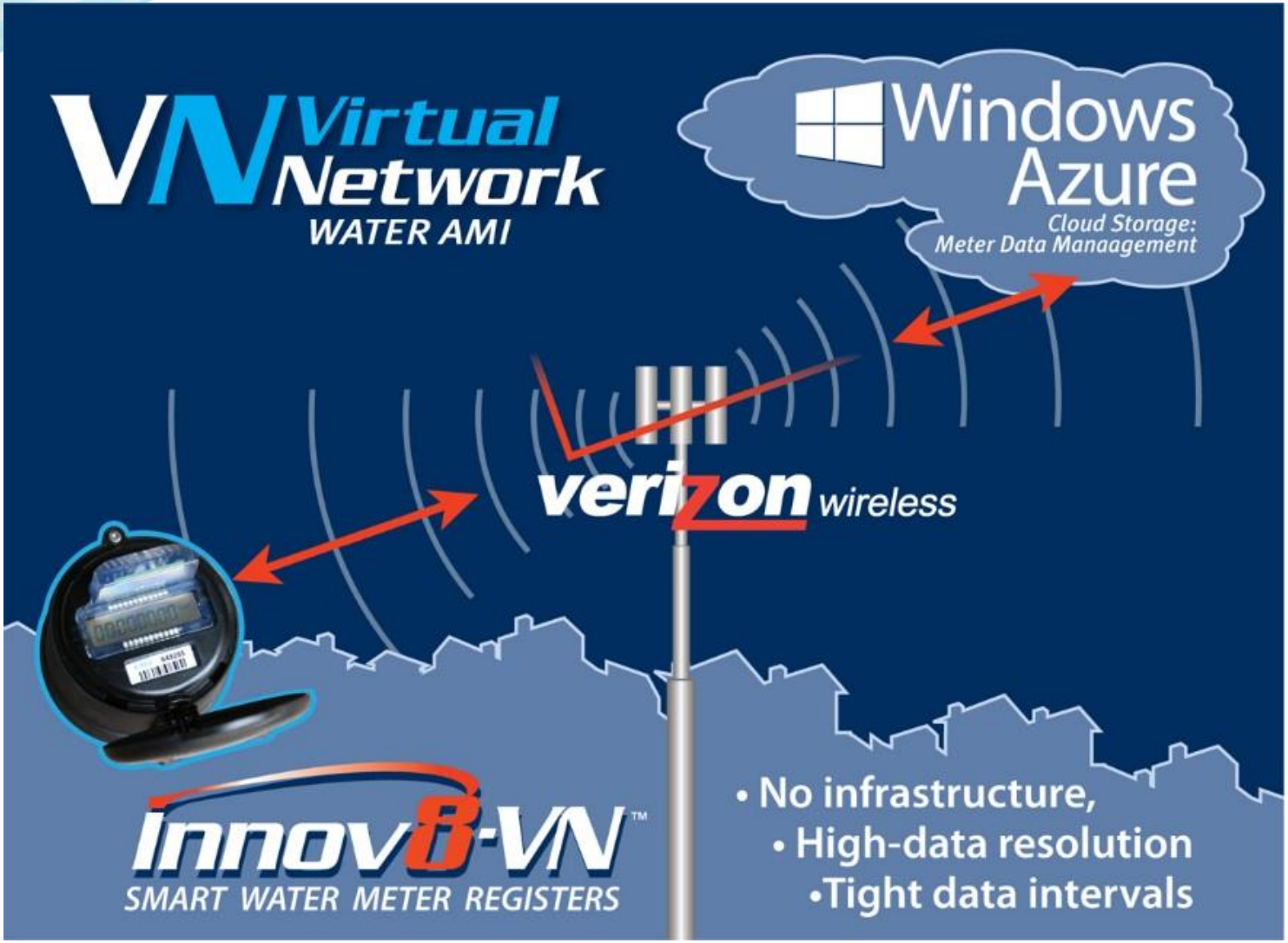
Logger attached to meter for overnight monitoring

look for WaterSense Meets EPA Criteria

Upgrade any meter instantly to a smart meter

The *innov8* can adapt to any common displacement multijet or turbine water meter

look for WaterSense Meets EPA Criteria



look for WaterSense Meets EPA Criteria

High-Resolution Data

Two-way datalogging with G2Mobile AMR System

Senior Site: residents per unit

Senior Sites	unit counts	%	people/ unit
Studio	0	0.0%	1.1
1 Bedroom, 1 Bath	72	94.7%	1.3
2 Bedroom, 1 Bath	4	5.3%	1.7
3 Bedroom, 2 bath	0	0.0%	3.0
4 Bedroom, 2 Bath	0	0.0%	5.5
Totals	**76**	100%	**1.3**

Target Calculations	GPD	ADC
Target with fixtures pre 1995	70	**92**
Target with fixtures 1995 - 2004	55	**73**
Target with WaterSense	43	**57**

Family Site: residents per unit

Family Sites	unit counts	%	people/ unit
Studio	0	0.0%	1.0
1 Bedroom, 1 Bath	4	11.4%	1.5
2 Bedroom, 2 Bath	14	40.0%	2.5
3 Bedroom, 2 bath	12	34.3%	4.5
4 Bedroom, 2 Bath	5	14.3%	6.0
Totals	**35**	100%	**3.6**

Target Calculations	GPD	ADC
Target with fixtures pre 1995	70	**250**
Target with fixtures 1995 - 2004	55	**196**
Target with WaterSense	43	**154**

Consumption Site #1

NYC Water Board Acct. xxxx-xxxxx-xxx 76 Units				
Date	Days	Meter Readings	W Cons	W ADC
12/07/14		805000		
01/07/15	31	841900	36900	**117**
03/08/15	60	916800	74900	**123**
04/07/15	30	951100	34300	**113**
07/16/15	100	1033100	82000	**81**
Totals	221		228100	102

Information from NYC Water Board Meter Readings

Consumption Site #2

NYC Water Board Acct. xxxx-xxxxx-xxx 35 Units				
Date	Days	Meter Readings	W Cons	W ADC
10/07/14		370800		
01/07/15	92	486300	115500	**268**
02/17/15	41	527200	40900	**213**
05/06/15	78	597300	70100	**192**
07/16/15	71	669699	72399	**218**
Totals	282		298899	227

Information from NYC Water Board Meter Readings

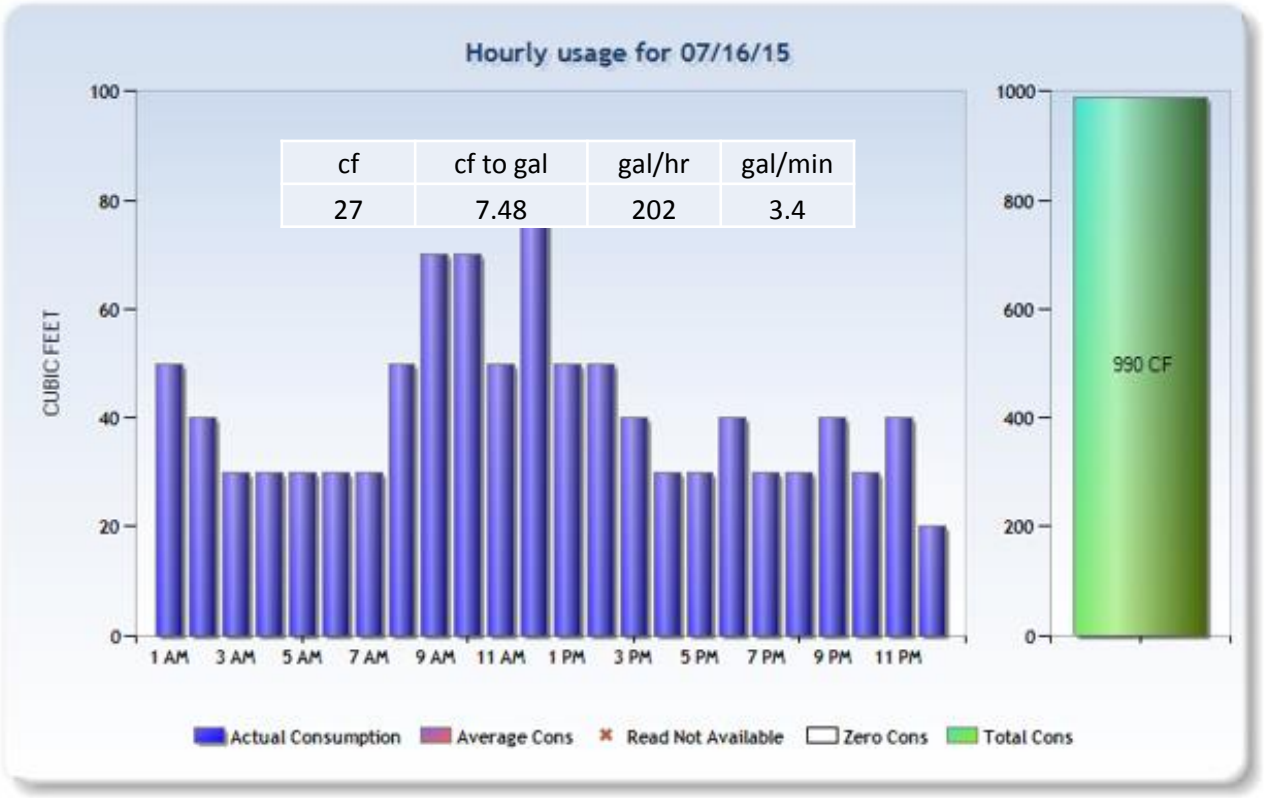
NYC DEP Hourly Usage

Service Address:
25 LAFAYETTE AV
BROOKLYN, NY 11217-0000

Account #: 8000303072001
Borough: Brooklyn **Block:** 02108 **Lot:** 0021
Building Class: D7

Account Balance: $0.00
AMR Installed On: 11/12/2013

Meter: G17002889 ▼ CCF ▼ Graph: Hourly Usage for Day ▼ Date (mm/dd/yy): 07/16/15 View



cf	cf to gal	gal/hr	gal/min
27	7.48	202	3.4

How big is the leak?

			35	
leak rate	minutes per day	gallons per leak	units	ADC impact
0.5	1,440	720	35	**21**
1.0	1,440	1,440	35	**41**
1.5	1,440	2,160	35	**62**
2.0	1,440	2,880	35	**82**
2.5	1,441	3,603	35	**103**
3.0	1,442	4,326	35	**124**
3.3	1,440	4,752	35	**136**

227
-92
135

Tub or toilet leak

One gallon per minute is equal to 1,440 gallons per day. Divided by 35 units – it adds 41 to the ADC.

Showerheads

Showerhead with flow restriction removed. At an average flow rate of 4.5 gallons per minute and an average shower length of 8 minutes per day this shower head consumes an average of 20 extra gallons per day or an additional 7,300 gallons annually per person.

Shower Diverters

- Leaking shower diverters waste water only when the shower is on, a 1 gallon per minute leak will waste approximately 3,000 gallons annually per person.

DC Water System

/amrgraphext/daily.php - premise: 3040884 | D.C. Water And Sewer Authority: Water Usage History

Daily Water Usage: March 2009

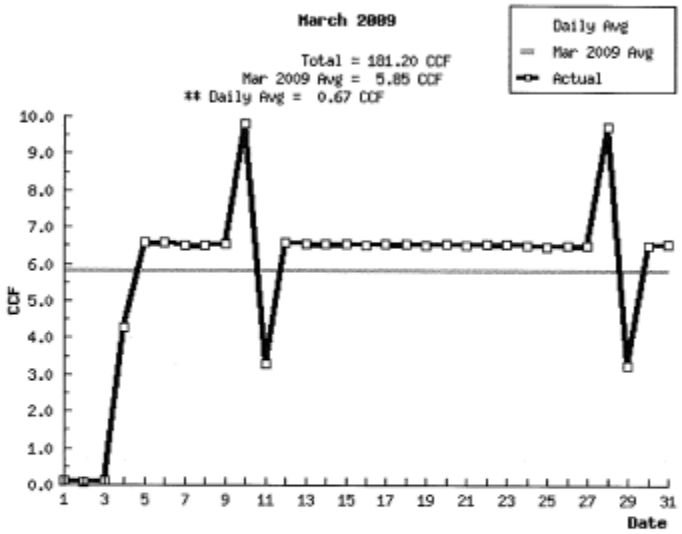
Service Address: 3715 Brandywine St NW

Navigate // Monthly » Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun

Close and Return to My Account
Print

Unit CCF

Y-Scale Fixed



** Average from June 1, 2008 to June 18, 2009 (381 days).

Download Meter Readings

All Readings from this meter can be downloaded as a Microsoft Excel Comma Separated Values File (.csv). Readings from June 2008 to June 2009. are available for download for this meter. Generally an AMR meter transmits two readings per day.

Using the link below:

- **PC**?right-click the link and select 'Download Link to Disk,' 'Save Target As,' or 'Save Link As' (the menu selection depends on your browser)
- **Macintosh**?"Control-Click" as this will simulate a right click on the Mac. Select

Daily Water Usage

March 2009

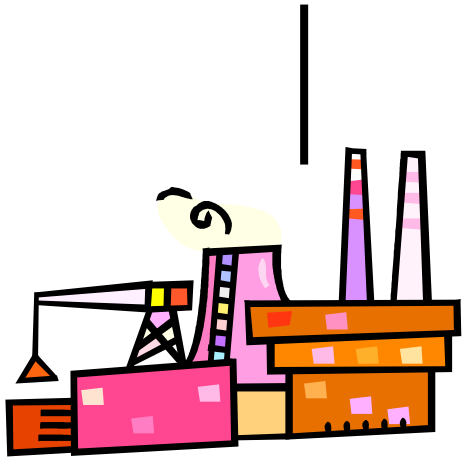
Day	Time (AM)	Reading (CuFt)	Usage (CCF)
1	3:51	45530	0.12
2	3:48	45542	0.07
3	3:42	45549	0.11
4	3:35	45560	4.29
5	3:30	45989	6.59
6	3:26	46648	6.60
7	3:27	47308	6.50
8	3:26	47958	6.51
9	3:22	48609	6.57
10	3:20	49266	9.81
11	3:21PM	50247	3.29
12	4:26	50576	6.60
13	4:28	51236	6.57
14	4:31	51893	6.56
15	4:34	52549	6.55
16	4:39	53204	6.53
17	4:41	53857	6.56
18	4:47	54513	6.54
19	4:52	55167	6.53
20	4:57	55820	6.56
21	4:59	56476	6.53
22	5:05	57129	6.54
23	5:06	57783	6.56
24	5:12	58439	6.51
25	5:12	59090	6.48
26	5:09	59738	6.50

6.5 ccf per day is equal to 4,860 gallons per day

Water and Energy are interdependent

Electricity production requires over 40% of all daily freshwater withdrawals

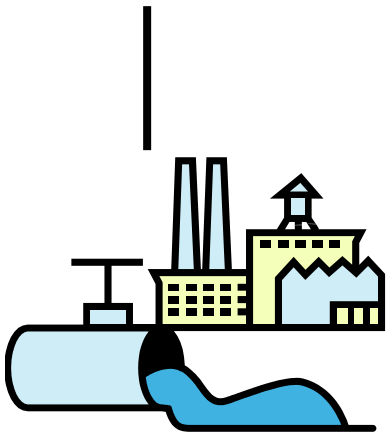
Water and wastewater utilities account for 30-40% of the electricity used by mid-sized cities



Power Plant

H_2O

ENERGY



Water / Wastewater Treatment Plants

Water savings often exceed energy savings

Case Study: Nashville, TN		
Metropolitan Development Housing Authority (MDHA)		
Implementation Year and Second Year Savings		
	1998	**1999**
Electric Savings	$374,552.00	$514,237.00
Water Savings	$1,087,332.00	$1,749,495.00

WATER SAVINGS = 76% OF TOTAL SAVINGS

However

Once the initial work of a performance contract or a new project is turned over to the housing authority, the future maintenance on the new equipment is the responsibility of the HA.

The major and very important difference between water and lighting is …..

Lighting fixtures fail closed and

Water fixtures fail OPEN

Sample Monitoring program

Property	Units	Meters	Target ADC	January 2015	February 2015	March 2015	April 2015	May 2015
Arbor Apts	30	2	122	121	121	125	54	102
Benning Court	97	3	185	156	114	280	181	145
Benning Woods	107	4	185	122	140	136	124	130
Brookland Ridge 1	154	1	200	152	140	135	136	127
Brookland Ridge 2	170	1	150	146	146	146	146	95
Carver Hall	96	6	155	149	132	130	130	130
Chesapeake	186	1	110	110	99	98	113	120
Claypoole	123	6	155	137	132	143	143	160
Cloisters	352	1	185	103	108	111	101	112
Fort Stanton	95	7	155	131	145	136	125	144
Franklin Commons	76	12	155	107	103	111	110	108
Geno Baroni	32	1	155	199	251	408	128	763
Ivy City	60	1	160	165	223	182	154	154
Morris Road	30	1	160	198	199	207	234	191
Pentacle	182	1	150	133	127	123	131	159
Riverbend	103	8	160	114	107	106	100	101
Saratoga	189	1	125	105	102	103	106	110
Stoneridge I	110	1	165	170	168	168	159	160
Stoneridge II	46	1	165	156	184	126	145	135
Total units	**2,238**	**59**	**159**	**131**	**130**	**137**	**127**	**137**

look for WaterSense Meets EPA Criteria

Questions?

Future HUD Water Wednesday Webinars

	http://epa.gov/watersense/hudwebinars
August 26	**Tracking Water and Energy Savings** Hear about how property managers can use the ENERGY STAR Portfolio Manager to track their water as well as energy. Register at bit.ly/1LPKFu7
September 16 *(date change)*	**Incorporating Green Infrastructure into Housing Developments** Learn about EPA resources to help integrate green infrastructure and hear about experiences from HUD grantees
October 28*	**Greywater Reuse – Is it Right for Your Facilities?** Learn more about greywater reuse and experiences of HUD grantees who have worked with cities to implement projects.

* Dates subject to change.

Help HUD Help You!

- In concert with this training, HUD is requesting feedback on water issues via the public forum “Water Watch” on Switchboard.
- http://switchboard.uservoice.com/forums/293865-water-watch
- Please let them know (a) what challenges your community or organization is facing with water access and water quality; and (b) what more do you think HUD can do to help?

WaterSense Information

Visit us online!

- www.epa.gov/watersense
  - HUD webinars at www.epa.gov/watersense/hudwebinars
  - BMPs at www.epa.gov/watersense/commercial
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Questions?

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