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A River of Energy Solutions

***Identify the vast amount of opportunities for
water conservation in Hospitals***

William Marks Hudson, PE, CEM Dept of Veterans Affairs

Essential Question

How do you find that so obvious, yet unattainable Water Conservation Measure (WCM)?

Warm-Up

Write down the single biggest obstacle at your facility for reducing water consumption.

Navigation Strategy

1. Identify Water Use (Audit, Experts, Walk-thru)
2. Identify Responsible Parties:
 - Users & Maintainers
 - Finance & Purchasing
3. Identify the locations of Water Use (Obvious?!)
4. Develop WCMs and Prioritize (Plan, Educate)
5. Implement, Monitor & Stay Aggressive

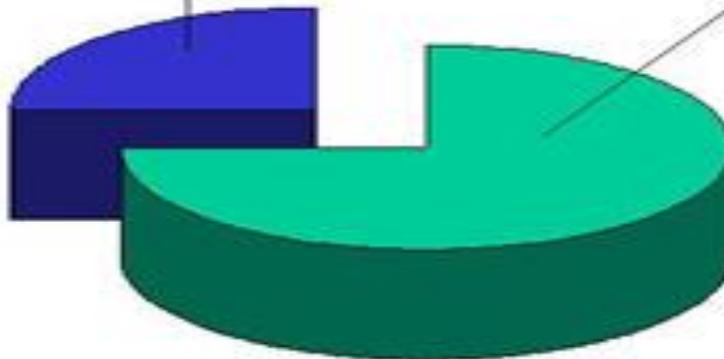
Identify Water Use - Audit

2002 Practice Greenhealth Hospital Water Use Study:

Domestic: 25%

Non-Domestic: 75%

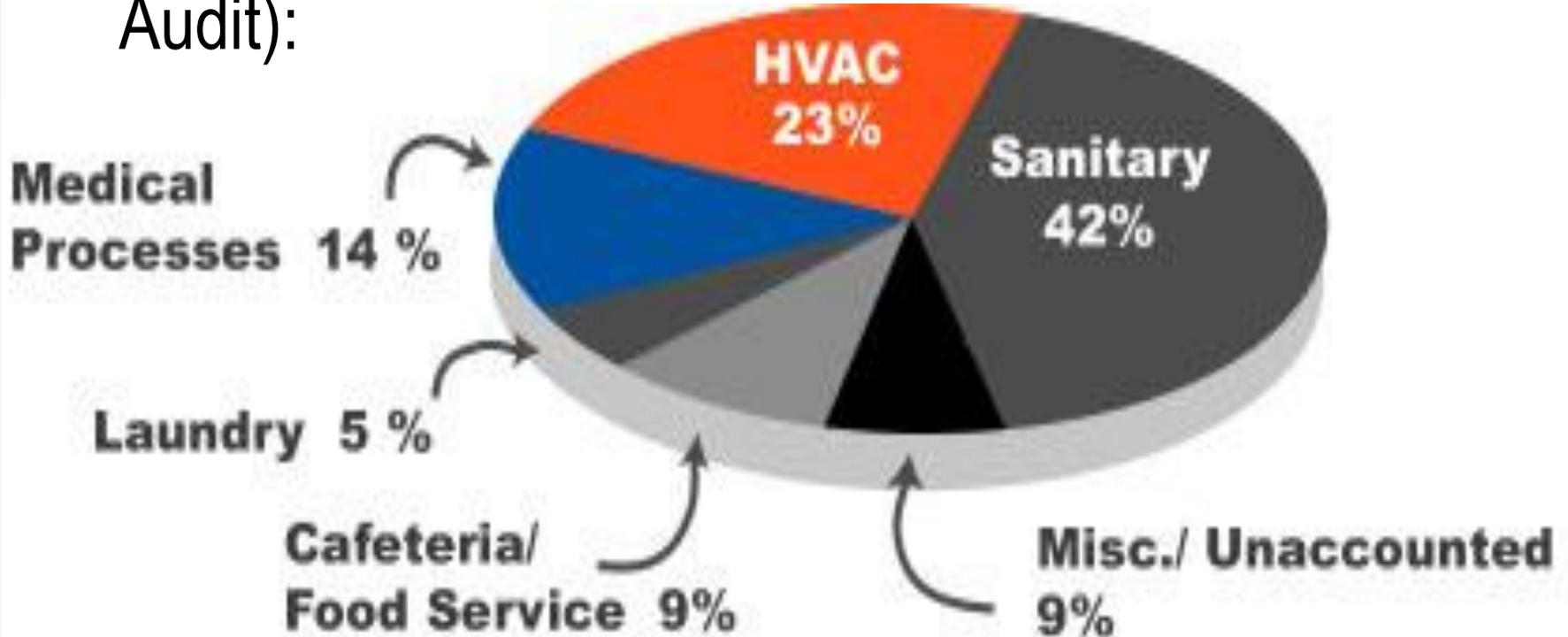
- Sinks
- Showers
- Toilets/Urinals



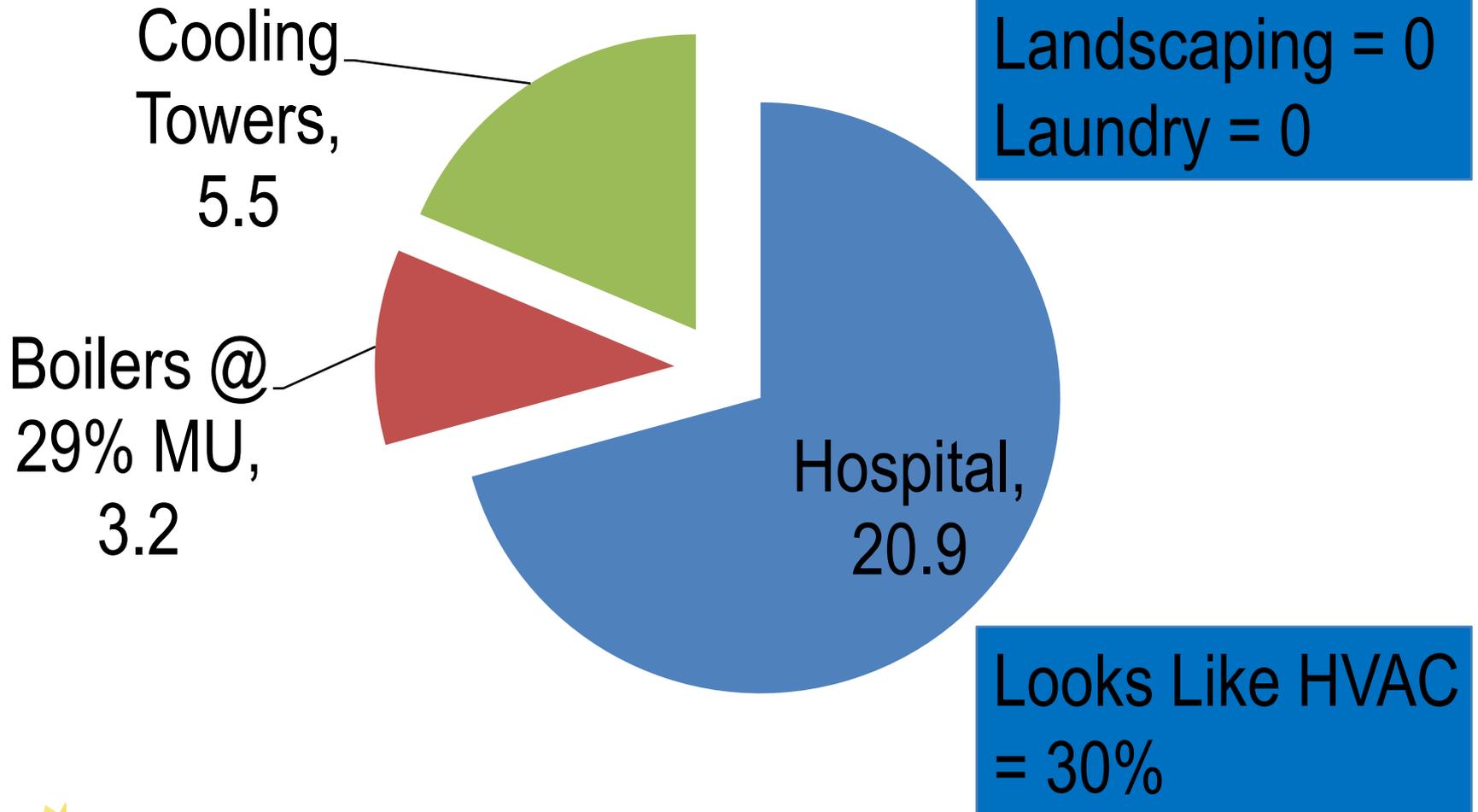
- Cooling Towers
- Boilers/Chillers
- Food Services (Kitchen)
- Operating Room
- Sterile Processing (Autoclaves)
- Radiology (Film Processing)
- Analytical Labs
- Pure Water Systems (RO/Stills)
- Medical Air/Vacuum
- Irrigation

Identify Water Use - Audit

1994 Metro Boston Hospital Study Found (6 Areas to Audit):

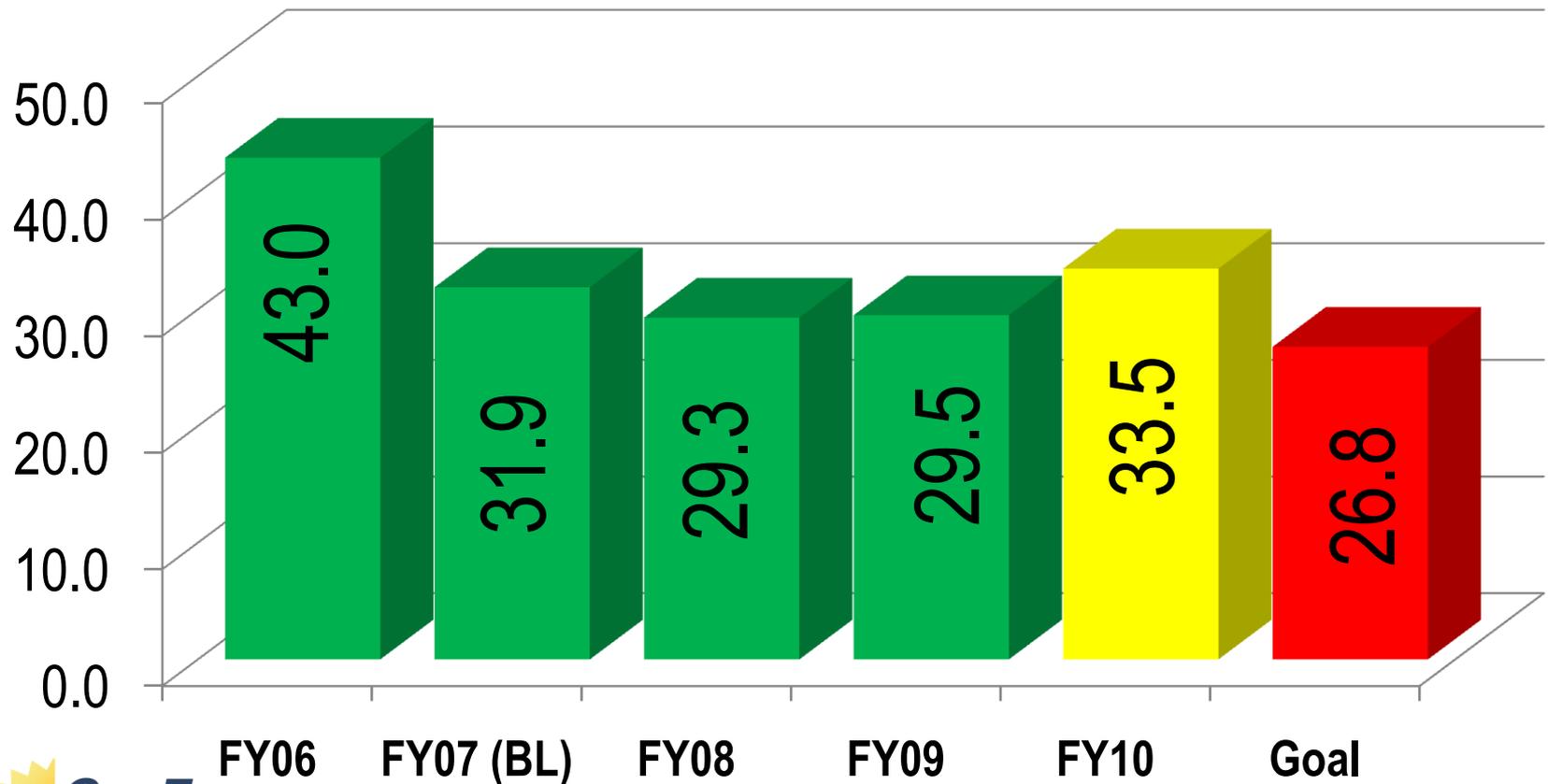


Hampton VAMC Water Usage Gal/SF



Identify Water Use - Audit

Tracking with the Tools Available (Gal/SF):



6 Areas of Concern

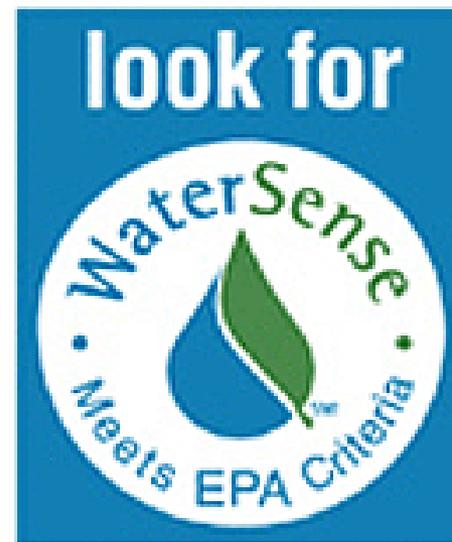
1. Sanitary: Water Closets, Urinals, Shower Heads, Lavatory Faucets, Leaks (42%)

Fixture	Existing	New	How
Toilet	1.6 - 6 gpf	1 - 1.6 gpf	Location
Urinal	1 - 4 gpf	0 - 1pt/f	40 to 70k Gal
Faucet	2 - 5 gpm	1.5 gpm	25 Min/Dy
Shower Head	2 - 3 gpm	1.5 gpm	15 Min/Prsn/Dy

6 Areas of Concern

1. Sanitary: Water Closets, Urinals, Shower Heads, Lavatory Faucets, Leaks (42%):

- a) Tub Overflow Control
 - b) Pool Filter Backwash
 - c) Leaking Fixtures
 - Toilets: 50 Gal/Dy
 - Faucets & Shower Heads (dripping): 1,000 Gal/Wk
- Any Energy Implications?



6 Areas of Concern

2. HVAC (23%):

- a) Blowdown – Cooling Tower & Boiler
- b) Steam System Maintenance (save energy) \$0.13/Gal
- c) Chiller Plant Optimization – Cooling Tower Evaporation
- d) Free Water to Cooling Tower – AHU Condensate to Tower, or better, first send to pre-cool coil then to cooling tower.
- e) Boiler/Chiller Plant roof drains for make-up water

**Tip – Get Sewer Credit for Make-up Water
\$45,000/Yr at Hampton**

6 Areas of Concern

3. Medical Processes (14%):

- a) Sterilizer Tempering Water (2 to 3 gpm – 24/7)
- b) Open Loop Cooling: Med Air, Vacuum Pumps, Ice Machines, Film Processors, RO Dialysis Rejection, others (**2 to 3 gpm, Over 1 million gallons/yr**)
- c) Condensate Recovery from Refrigerators/Freezers
- d) Once through to Twice/Thrice?

At \$1.10/100 Gal, 1 million gallons = \$11,000

6 Areas of Concern

4. Cafeteria/Food Service (9%):

- a) Steam System & Trap Maintenance
- b) Full Load Dishwashing
- c) Continuous Flow on Drain Trays at Beverage Station
- d) Reuse Dishwasher Rinse Water as Flush Water at Garbage Disposals
- e) Investigate Water Going Down Floor Drains

6 Areas of Concern

5. Laundry (5%):

- a) RCx water levels per wash. Do full loads
- b) RCx Rinse cycles, use only what is truly needed
- c) Reclaimed rinse water to another use, after preheating
- d) Others:

6 Areas of Concern

6. Misc/Unaccounted (9%):

a) Cleaning/Housekeeping:

- Can be as high as 10%
- Dry carpet cleaners vs wet methods
- Judicious use of mop water
- Clean as required vs periodic

b) Find Water Cooled Water Coolers

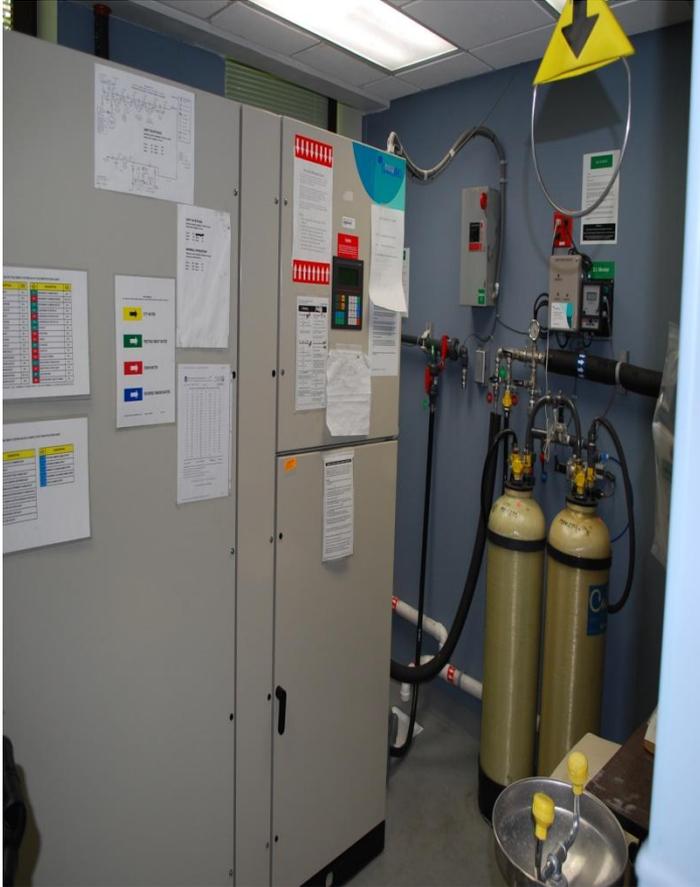
c) Landscaping: Natural vegetation, drought resistant , common sense sensing☺ and don't forget your:

Sanitary Credit!

Process Equipment - XRay



Process Equipment – RO Reject



HVAC – AC Condensate

6000 CFM OA @
90 F & 48% rh
= ½ gpm

Location?

Cooling Tower
PreCool OA
Landscaping



HVAC – AC Condensate



**4 Ton ACCU –
Landscaping, Drip Line Perhaps?**

Food Service – Open Loop Cooling

2 gpm – 1,000,000 Gal/yr



Audit Toolbox



Case Study

1. 178 faucets at 2.2 gpm to 1.5 laminar flow
2. 33 patient hand showers at 2.5 gpm to 1.5
3. 50 water closets at 3.5 gpf to 1.6

So,

1. Faucets save 0.7 gpm/dy
2. SH save 0.75 gpm/dy
3. WC save 1.9 gpf

Case Study

<i>Fixture</i>	<i>No</i>	<i>Save/Ea</i>	<i>Use</i>	<i>Gal/yr Saved</i>	<i>\$\$ Saved/yr</i>	<i>Who</i>
Faucet	178	0.7 gpm	25 min/dy	1,121,400	\$11,214	Infection Control, GEMs, Maintenance Energy Savings Not Included
SH	33	0.75 gpm	15 min/dy	133,650	\$1,337	
Toilet	50	1.9 gpf	6/dy	205,200	\$2,052	

ST 1,460,250 \$14,603

Education & People



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Best Management Practice: Water Management Planning

A successful water management program starts with developing a comprehensive water management plan. This plan should be included within existing facility operating plans.

Water management plans should provide clear information about how a facility uses water from the time it is piped in to its ultimate disposal. Knowing how water is used and what it costs enables Federal agencies to make appropriate water management decisions.

Water management planning is covered across:

- [Water Management Plan Overview](#)
 - [Water Use Policy Statement and Goals](#)
 - [Utility Information](#)
 - [Water Use Information](#)
 - [Metering or Measurement Plan](#)
 - [Emergency Response Information](#)
 - [Comprehensive Planning](#)
 - [Opportunity Assessment](#)
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- Urinals

Website Resources

Practice Greenhealth:

www.cms.h2e-online.org/ee/facilities/waterconserve

Water Use Case Study: Norwood Hospital:

www.mwra.state.ma.us/04water/htm1/bullet1.htm

Hospital Checklist:

www.swfwmd.state.fl.us/conservation/waterwork/checklist-hospital.htm

American Society of Healthcare Engineering

www.ashe.org

Review Navigation Strategy

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