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# Comprehensive Water Conservation in Healthcare Facilities

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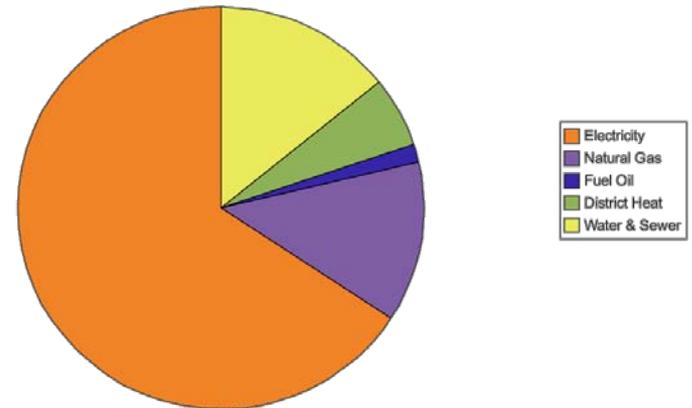
# Overview

- Why Water Conservation?
- Lessons Learned
- Water Conservation Opportunities
- Wrap up and Discussion

# Why Water Conservation?

- Finite supply
- Something people care about
- Expensive
- Getting more expensive
- Typically short payback

Share of USA Commercial Building Utility Costs



# Federal Water Savings Mandates

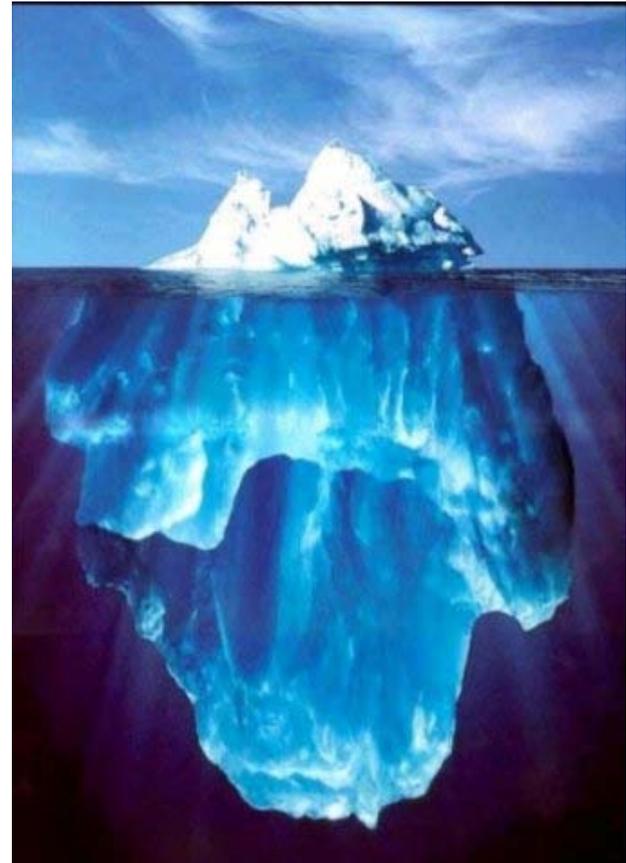
- **EXECUTIVE ORDER 13423**
  - **Reduce water use by 16%:** Reduce water intensity (gallons/sf) by 2% each year through 2015 for a total reduction of 16%, relative to the agency's 2007 baseline.
- **EXECUTIVE ORDER 13514:**
  - **Reduce water use by 26%:** Extends the requirements of 13423 (reduce water intensity by 2% each year) by 5 years.

# Lessons Learned

- Follow the water
- Don't forget energy
- You're never done

# Water Conservation Opportunities

- Strategies
  - Reduce
  - Reuse
  - Replace
- Conservation areas
  - Domestic (bathroom)
  - Process & Plant
  - Steam



# Follow the water...

- How much water?
- Where is it used?
  - Bathrooms
  - HVAC
  - Dietary
  - Process
  - Irrigation
  - Leaks
- How do you know?

# Starting With A Water Balance Is Key

Customer Name  
Water Balance  
Date: 99/99/99

Category	Subcategory	Pre-Retrofit Conditions		Post-Retrofit Conditions		Savings	
		Amount (kgal/yr)	Percentage (%)	Amount (kgal/yr)	Percentage (%)	Amount (kgal/yr)	Percentage (%)
Domestic	Domestic	17,355	11.3%	11,849	15.0%	5,506	31.7%
Sterlizers - CTS	Condensate Tempering	16,354	10.7%	393	0.5%	15,961	97.6%
Sterlizers - VWS	Condensate Tempering	2,883	1.9%	721	0.9%	2,162	75.0%
Medical Vacuum Pumps	Process	5,657	3.7%	874	1.1%	4,783	84.6%
Medical Air Compressors	Process	3,224	2.1%	786	1.0%	2,437	75.6%
Condensate Coolers and Tempering	Condensate Tempering	41,199	26.9%	3,145	4.0%	38,054	92.4%
Chiller Cooling Tower Makeup (Uris, Main Lachman)	Cooling	5,271	3.4%	-	0.0%	5,271	100.0%
Chiller Cooling Tower Makeup (Other)	Cooling	11,000	7.2%	11,000	13.9%	-	0.0%
HVAC (water cooled AC and ice machines)	Refrigeration	5,000	3.3%	5,000	6.3%	-	0.0%
Cafeteria and Food Service	Food Service	25,000	16.3%	25,000	31.7%	-	0.0%
Pathology, Morgue AC, Sewage Ejector	Process	5,000	3.3%	5,000	6.3%	-	0.0%
Cleaning	Process	3,000	2.0%	3,000	3.8%	-	0.0%
Unaccounted For	Unaccounted	12,092	7.9%	12,092	15.3%	-	0.0%

<b>Total</b>	153,035	100%	78,860	100%	74,175	48.5%
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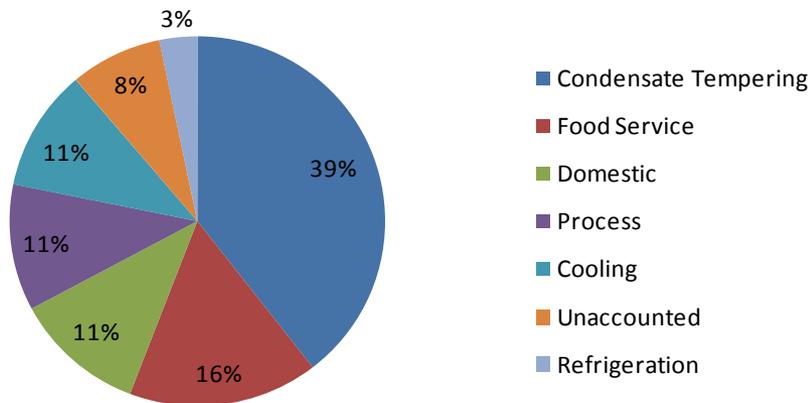
<b>Total Billed Usage</b>	153,035
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Billing History (August through July)

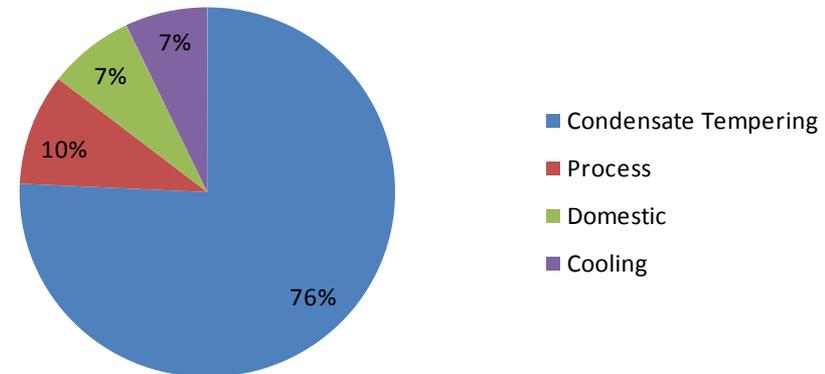
Account #	Service Address	CCF	Kgal
#90001-31817-001	Address #1	35,064	26,228
#60001-31818-001	Address #2	167,654	125,405
#30001-30783-001	Address #3	1,874	1,402
<b>Total:</b>		204,592	153,035

# To Finding All The Opportunities

## Pre-Retrofit Water Balance



## % of Total Savings by Use



# It's Not Just About the Bathrooms

## Process Water Reductions

- Irrigation Systems
- Steam Sterilizers, Vacuum & Gravity
- Vacuum Pumps/Air Compressors
- Food Service Area
- Refrigeration Equipment
- Pure Water Stills
- Analytical Equipment
- Animal Cage Washers
- Laundry
- Boiler Blow-down
- Swimming Pools
- Cooling Tower Makeup Water
- Tempering Systems

## Steam

- Steam Distribution System Analysis
- Steam Trap Replacement
- Insulation of Steam Fittings
- Condensate Recovery

## Reuse, Re-circulate and Replace

- Reverse Osmosis Units
- Rainwater Harvesting
- AHU Condensate reuse
- New Wells
- Leak Reduction

## Domestic Water Reduction

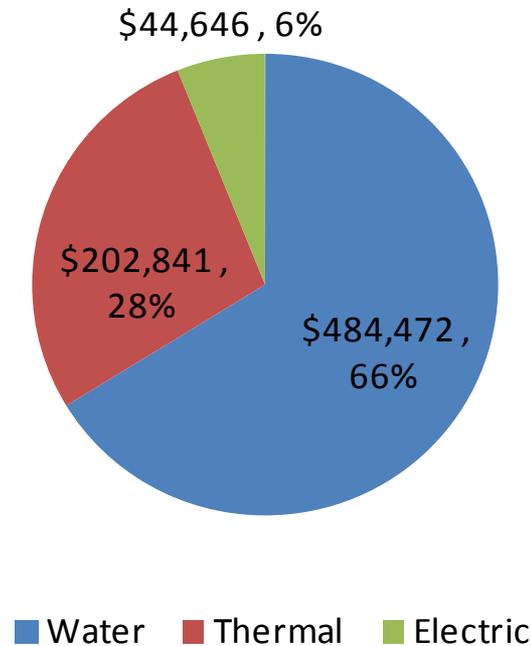
- Toilets
- Sinks
- Showers

# You Do Not Just Save Water

- Saving Hot Water Saves more Energy
  - Food Prep
  - Dish Washing
  - Bathrooms
  - Laundry

# Water and Energy are Related

## Savings by Utility



## San Francisco VA Medical Center



- Major tertiary care referral center serving Northern California
  - Affiliated with UCSF School of Medicine
  - Largest funded research program in VA system
- 145 beds
- Outpatient visits: 335,427
- Staff – FTE's: 1,770

### Project Highlights

Reduction in utility-supplied water use decreased demand on building water pump: \$3,700/year energy savings

### Annual Savings

Water/Sewer	\$ 242,273
Electricity/Natural Gas	\$ 41,594
Maintenance	<u>\$ 5,370</u>
Year 1 Savings	\$ 289,237

Price: \$ 896,894

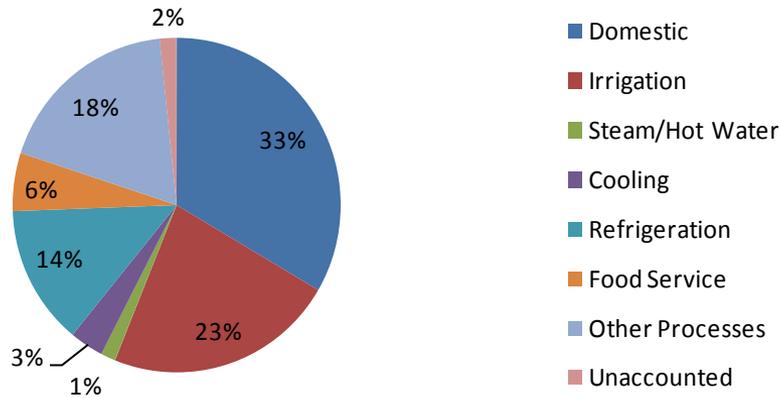
Payback: 3.10 years

### Scope:

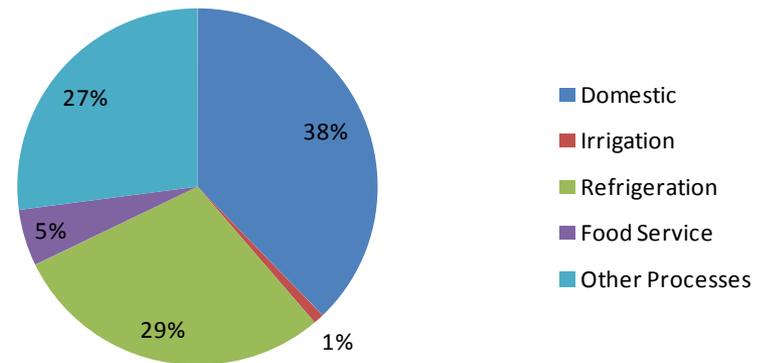
- new reverse osmosis systems to replace stills (pure water for medical research)
- 13 new air-cooled refrigeration units
- sterilizer upgrades (10 units)
- new bathroom fixtures
- sewer credit for cooling tower evaporation & irrigation
- food service equipment retrofit

# San Francisco VA Medical Center

## Baseline Water Balance



## % of Total Savings by Use



# Benefits of H2O's Comprehensive Approach

## Domestic Only

- 33% of total use
  - 16% saved (8,191 kgal)
  - Savings: \$70,406
  - Payback: 5.1 years
  
  - Leverage: : \$344,989
- Additional scope which could be included in a 10 year payback*

## Comprehensive

- 100% of total use
  - 43% saved (21,523 kgal)
  - Savings: \$289,237
  - Payback: 3.1 years
  
  - Leverage: \$1,995,735
- Additional scope which could be included in a 10 year payback*

# Technology Keeps Improving

- Look beyond traditional conservation areas
- 4.5 → 3.5 → 1.6 → 1.28 → 1.1 → 0.8 → ?
- 1 Pint and Waterless Urinals
- Weather based irrigation controllers
- Reclaimed water
- Green chemical water treatment
- Non-chemical water treatment
- Xeriscaping

# Why Water Conservation?

- Water projects yield attractive returns on investment
- Mandated water savings goals
- Develop your water balance
- Use an all inclusive approach
- Water and Energy are related
- Water conservation is continuously evolving

# Questions/Discussion

Please feel free to contact me with any questions and/or comments;

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