Water Efficiency for Federal Buildings

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Why is Water Conservation Important?

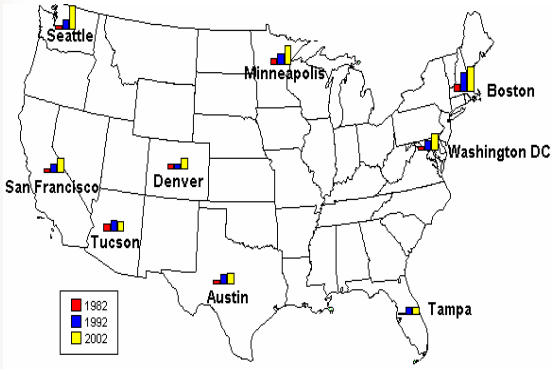
- Save money now – tremendous potential to save water, energy, and O&M costs
- Increasing resource scarcity means
  - Limited and costly new supply options
  - Increasing water and sewer costs
  - Your cheapest source of water is the one you already have
- Defer or eliminate costly capital investment
- Legislation mandates it

Supply Stress

- Static supply, increasing water use by an increasing population
  - less than 1/2 of 1% available for use
  - 25% of U.S. groundwater is currently overused
  - Saltwater intrusion in many areas
  - Snow pack is not sufficient in many areas
- U.S. population expected to increase from 297 million in 1995 to 405 million by 2050
  - Mostly in areas with limited supplies

US Drought Impacts 2003

Water Rates Increasing Nation-wide



Water Efficiency Requirements

- Energy Policy Act (EPACT), 1992
  - Requires Federal agencies to implement all life-cycle cost-effective water conservation measures with payback periods of 10 years or less.
- E.O. 13123
  - Report annual water use every two years
  - Develop water management plans
  - Implement a minimum of four Best Management Practices

Data on Federal Water Use

A 1997 FEMP study estimated Federal Water Use

- 300 – 450 Million Gallons per day
- $225 – 300 Million per year
- Conservation potential of 40%
- Average cost per thousand gallons
  - $1.29 Military
  - $3.42 Civilian

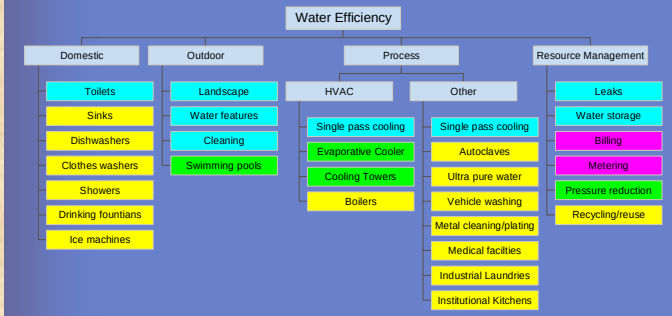
Results to Date of 13123 Goals

- FY00 Annual Report shows water use 157% higher than estimated
- Water plans
  - 819 Facilities with plans
  - All DOL and USPS facilities have plans
- Wide variety of projects
  - Recycled effluent
  - Low water use domestic fixtures
  - Leak detection
  - Efficient landscaping
  - Chilled water system improvements

Estimated vs. Reported Water Use by Agency

Agency	Estimated MGY	Actual MGY
Central Intelligence Agency	82.1	135.7
Department of Agriculture	1,366.90	1,579.40
Department of Commerce	229.6	627.9
Department of Defense	76,273.30	207,371.40
Department of Energy	2,766.30	5,483.80
Department of Interior	1,995.80	1,850.80
Department of Justice	1,781.20	9,098.70
Department of Labor	467.2	
Department of State	16.1	
Department of the Treasury	259.2	344.2
Department of Transportation	771.2	1,713.00
Department of Veterans Affairs	15,444.60	9,390.00
Environmental Protection Agency	46.7	161.5
Federal Communications Commission	1.1	0.8
Federal Emergency Management Administration	16.4	41
Federal Trade Commission		3.3
General Services Administration	2,195.80	4,000.00
Health & Human Services	1,802.40	1,327.60
National Aeronautics and Space Administration	1,138.40	2,215.00
National Archives and Records Administration	52.9	143
Nuclear Regulatory Commission		23
Postal Service	2,833.90	10,446.00
Railroad Retirement Board	11.7	0.9
Social Security Administration	48.2	151.8
Tennessee Valley Authority	19	377.7
Other	576	
Total	**109,620.10**	**256,108.80**

What is water efficiency?

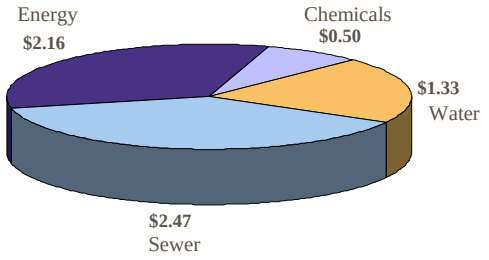


- Direct energy
- Indirect energy
- Dollars only
- Water Only

Water Project Myths

- Only appropriate in arid climates
  - Eastern U.S. has had a number of severe droughts in recent years
  - Eastern water can cost significantly more
  - Lack of sewer capacity drives water conservation
- Have long pay back periods
  - PNNL found that most projects payback in < 2 years
  - Other savings such as chemicals & labor improve economics of water projects
- Includes only low flow fixtures, which don't work
  - Most surveys show more than 80% of users are satisfied with low flow fixtures
  - Think outside the bowl, there is much more to water efficiency than restrooms

Total Savings per 1000 Gallons



Projects That Work!

- Energy intensive equipment
  - Shower heads – Aerators – Steam traps
  - Laundries – Kitchens – Sterilizers/autoclaves
  - Vehicle wash bays – ultra-pure water
- Low initial cost
  - Cooling water management – conductivity meter
  - Disconnecting unused lines to abandoned areas
- Continuous flow equipment
  - Garbage disposals – Tray washers – Ice machines
  - Leak dectection

Projects That Work!

- Heavily used equipment
  - Washing machines in military housing
  - Toilets in offices and commercial facilities
- Landscape Irrigation
  - Irrigation controls – rain sensors – sprinkler head position
  - Conservation landscaping – native plants
  - Reduced turf areas – warm season grasses
- Billing oversight
  - Reuse/reclaimed and other non-potable sources
  - Billing rates – Meter sizing – Deduct meters

Continuous Flow Equipment

Grissom AFB garbage disposal

1.5 gpm continuous flow when not in use

That equals 788,400 gallons per year wasted!

At $3.82/kgal = $3,010 per year

Water Leaks

Detected By Navy Team

- Leaking at 20gpm = about 30,000 gpd
- Water is under only residual pressure
- At $3.82/kgal = $114/day
- Not including cost to repair pavement and damaged vehicles.

4" AC pipe under pavement

Hickam AFB

Tank cleaning, inspection & repair

Dry diving suit w/hard helmet

McChord AFB

- Over 2,000,000 gallons saved
- One-step operation. No draining of tank or disinfecting after work
- Suction hose used for tank cleaning
- Underwater leak repair with NSF approved 2-part epoxy
- Diver disinfected with 200ppm hypo-chlorite solution

National

- Routine inspection discovered water was running to viewing areas 24 hours/day
- Efficiency measures include:
  - New anti-backflow devices
  - Floats and valves to reduce water flow
  - Rain sensors to control irrigation systems
  - New metering devices
    - Indicates where water is being used
    - Allows zoo to get credit for water not going to sewer system, thereby reducing sewer charges

National Zoo – Washington, DC

- Annual water savings: 85 million gallons
- Annual savings: estimated at $500,000
- Costs estimated at approximately $500,000
- Simple payback: one year.
- UESC Washington Gas

Norwood Hospital
Boston, Massachusetts

- Reduced usage 29%
- Water use before: 51.2 million gallons
- Water use after: 36.6 million gallons
- Water cost: $6.55 per kgal

Measures Taken at Norwood

- Increased cooling tower concentration ratio from four cycles to twelve cycles
  - Annual water savings: 600,000 gallons
  - Project cost: $0
  - Annual savings: $3,900
  - Simple payback: immediate
- Installed faucet aerators and flush valves in lavatories
  - Annual water savings: 3 million gallons
  - Project cost: $8,092
  - Annual savings: $19,679*
  - Simple payback: 0.41 years

* Does not include energy savings from hot water!

Measures Taken at Norwood

- Replaced water-cooled refrigeration system with air-cooled system
  - Annual water savings: 2.1 million gallons
  - Project cost: $5,500
  - Annual savings: $13,750
  - Simple payback: 0.40 years
- Recirculated cooling water on vacuum pumps, compressor, and sterilizer.
  - Annual water savings: 12.5 million gallons
  - Project cost: $44,800
  - Annual savings: $83,186
  - Simple payback: 0.54 years

FEMP Overview

- Reduce the cost and environmental impact of the Federal government
  - by advancing energy and *water efficiency*
  - promoting distributed and renewable energy
  - improving utility management decisions
- This is accomplished by
  - creating partnerships,
  - leveraging resources,
  - transferring technology,
  - providing training and technical guidance

Water Efficiency Program

- Water Efficiency is an integral part of comprehensive energy management ***and*** sustainable facilities
- FEMP assists Federal agencies identify and implement water efficiency measures
- Help agencies reduce water utility costs including, water, sewer and ***stormwater***

FEMP Water Services

- Low cost water audits are available thru SAVEnergy program
- Water technical assistance:
  - Project feasibility studies
  - Design review
  - Workshops
- Technology areas

Low Impact Development
Institutional Efficiency
Industrial Efficiency
Conservation Landscaping

Stormwater –The Final Utility Frontier

- Many facilities are charged stormwater fees
- These fees are rising in response to new EPA clean water requirements
- Measures include
  - Green Roofs
  - Biorention or Rain gardens
  - Rain water harvesting
- Benefits of low-impact development measures
  - Reduce long-term costs
  - Provide another source of water for site
  - Leave more land for mission related construction

FEMP Water Future Plans

- Improved Technical Information
  - Web site
    - Improve access to water information
    - Develop case studies and better data for facilities
  - Water Efficiency Tool Kit
    - Provide Water Awareness Campaign resources
    - Software (Watergy)
- Chesapeake Bay Initiative
  - Complete projects to improve health of the bay
  - Partner to develop resources for Federal facilities
- More Projects
  - Alternative Financed – ESPC and UESC
  - TA call

Summary

- Questions??
- Comments
- Ideas