

Internal Water Efficiency Programs & Assessment Strategies

NC Division of Pollution Prevention and Environmental
Assistance &
Waste Reduction Partners

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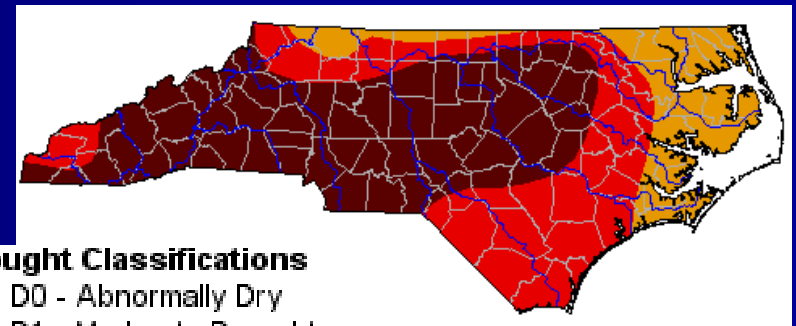


Driving Factors

- Chronic drought conditions
- Rising utility costs in times of budget cuts
- Sustainability leadership commitments
- NC state agencies, universities, C.C Requirements –SB668 20% reduction by 201



Fontana Lake – October 2007

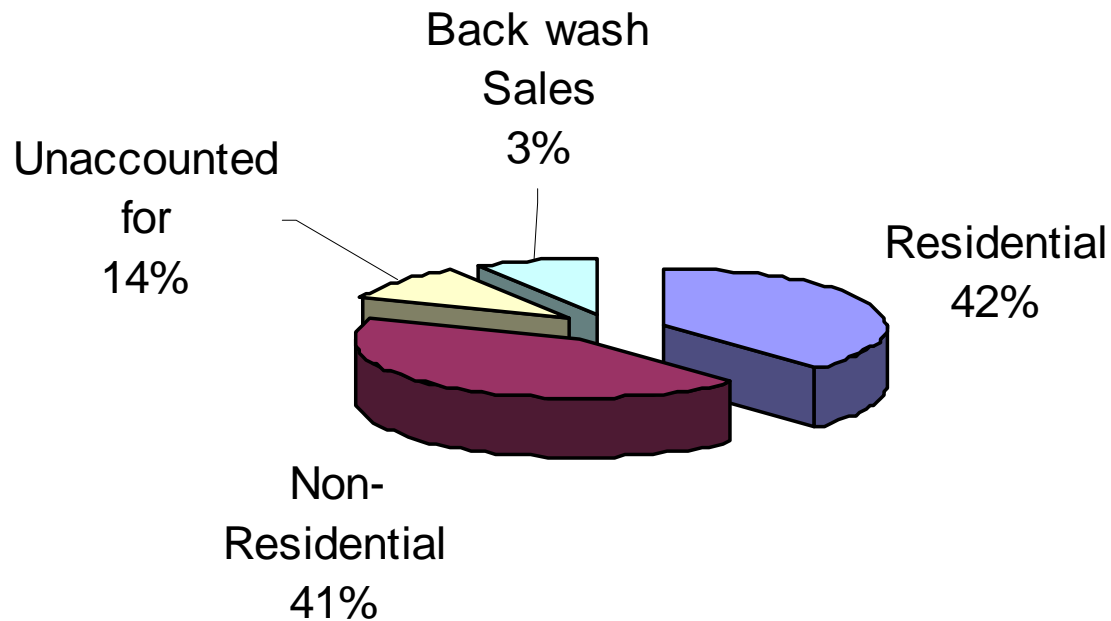


Drought Classifications

- D0 - Abnormally Dry
- D1 - Moderate Drought
- D2 - Severe Drought
- D3 - Extreme Drought
- D4 - Exceptional Drought

Opportunities in the Industrial, Commercial and Institutional ICI Sectors

Public Water Supply Uses in NC



A vertical decorative strip on the left side of the slide features a blue background with several water droplets. One droplet is in the process of falling, creating a crown-like splash on the surface below it. The droplets are rendered with realistic highlights and reflections, giving them a three-dimensional appearance.

Benefits of Water Efficiency Programs

- Reduced Water Demand
 - Generally faster, cheaper & easier than supply-side programs
- Waste and Wastewater Treatment Savings
 - Reduces costs and defers plant expansion
- Less Environmental Impact
 - Due to less surface and subsurface withdrawals
- Sustained Water Quality
 - New supplies can be of lower quality

Principles of Water Management

Categories of Water Efficiency Measures


- Reducing Losses
- Reducing Overall Water Uses
- Employing Water Reuse

Changing Behavior vs. Equipment

Vocabulary: Conservation vs. efficiency

Optimizing facility water use means more than conducting an on-site study.

Business Planning for a Successful Water Efficiency Program

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- Step 1: Establish commitment and goals –
 - Top management support
 - Step 2: Line up support and resources
 - Step 3: Conduct a water assessment
 - Step 4: Identify water management options
 - Step 5: Prepare a plan and implementation schedule
 - Step 6: Track & communicate results

Self-Assessments

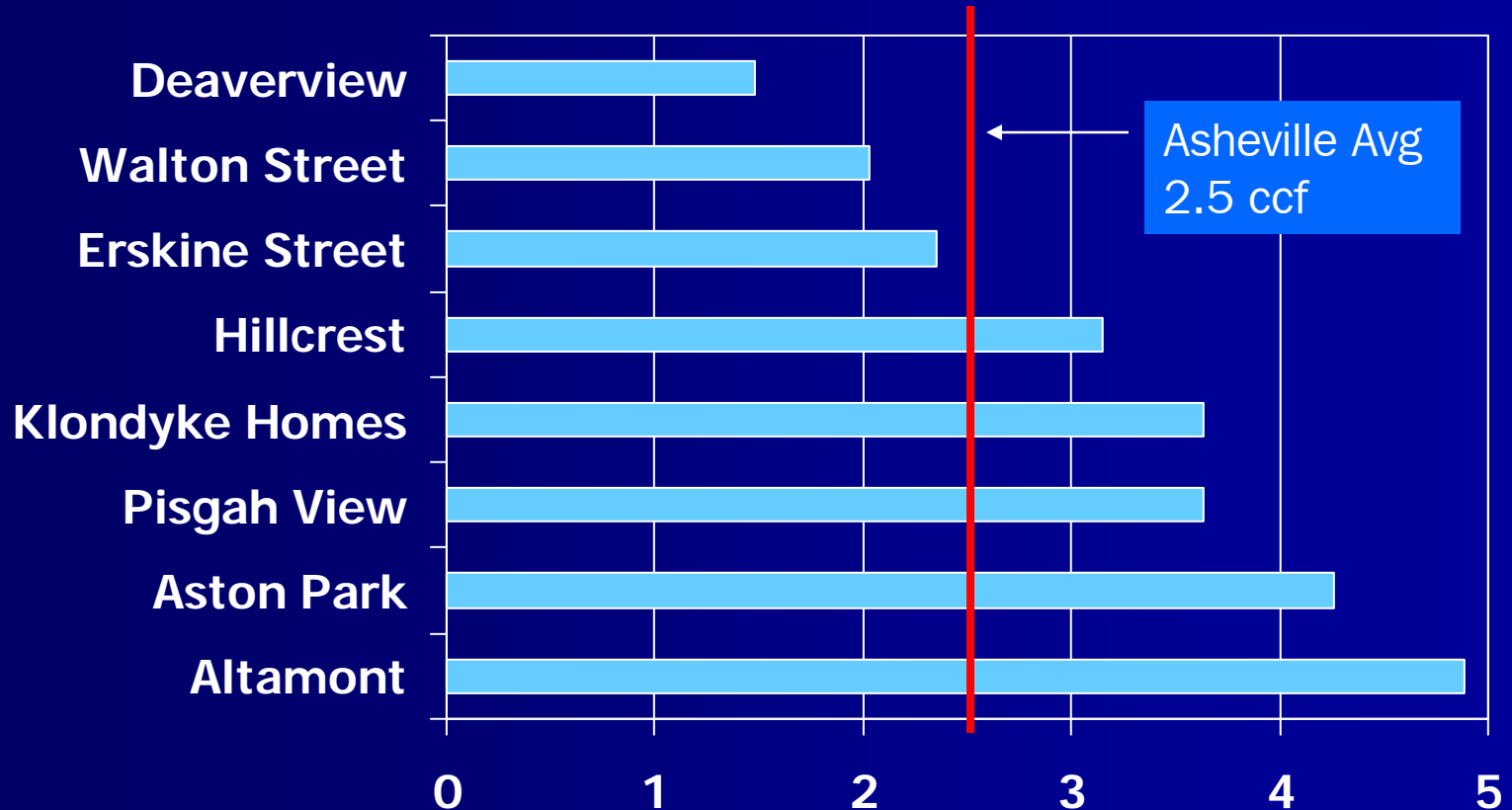
Questions for Top Management

- *Is W.E. included in organization's environmental policy statement, energy plans, ISO targets, etc.?*
- *Are W.E. responsibilities delegated?*
- *Are quantitative goals established and tracked?*
- *How are W.E. goals communicated?*
- *What incentives exist?*
- *Has the facility engaged available help?*


Benchmarking Water-Use

Example: Asheville Housing Authority Apartment complexes


CCF Per Person/Month



The Water Assessment Process

- 
- A vertical decorative strip on the left side of the slide features a blue background with several water droplets. One droplet is in the process of falling, creating a crown-like splash on the surface below it. The droplets are reflected on the surface, creating a symmetrical effect.
- Confirm Client's Commitment
 - Assemble Audit Team
 - Collect background Information
 - Conduct on-site water audit
 - Tools and Measurements
 - Water Balance
 - True Cost of Water
 - Identify target areas for efficiency
 - Prepare report/recommendations
 - Follow-up

Water Assessment Prep


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- A vertical decorative strip on the left side of the slide features a blue background with several water droplets. One droplet is in the process of falling, creating a crown-like splash on the surface below it. The droplets are reflected on the surface, creating a symmetrical effect.
- Pre-assessment Screening
 - Data Collection
 - Audit Team
 - Efficiency Project Leader
 - Facilities/plant Management
 - Maintenance Supervisor
 - Personnel familiar with Operation
 - External assessor (YOU!)

Collect Background Information

- Water and Sewer bills – previous full year (note rate structures)
- Water Meter Sizes and locations
- All source of potable and non-potable water
- Process sub-metering data
- Wastewater treatment
- Production flow diagrams
- Plumbing diagrams
- Irrigation drawing & controls
- Number of employee
- Shifts, work, and clean-up schedules.
- Products and services
- Production rates/occupancy
- List of known water consuming processes and uses
- Prior water or energy surveys
- Maintenance schedule info

See Water Survey Data Sheet

Conduct Walk-through

- 
- A vertical decorative strip on the left side of the slide features a blue background with several water droplets. One droplet is in the process of falling, creating a crown-like splash on the surface below it. The droplets are reflected in the water below, creating a symmetrical effect.
- Identify all water consuming equipment
 - Confirm plumbing diagrams
 - Quantify water flow rates
 - Determine water quality needs for each process
 - Review current water saving measures
 - Observe water uses, clean-up, change-overs
 - Note all water losses, evaporative, product use, excessive pressure, and leaks
 - Judge current water use efficiency and potential for improvement

Key Areas to Check During a walk-through Survey

Process and Equipment Use

- Cleaning, washing rinsing
- Metal finishing
- Painting
- Dyeing and finishing
- Photo processing
- Reuses
- Product fluming (water transport)
- Water use in products

Cool and Heating

- Single-pass cooling
- Cooling tower chillers
- Boiler, hot water, steam systems
- Air washers
- Boiler scrubber

Sanitary and Domestic

- Toilets
- Urinals
- Faucets
- Showers

Kitchen Food

- Cafeteria uses
- Dishwaters
- Ice machines
- Faucets

Other Facility Support

- Floor washing
- Air emission wet Scubbers
- Building washing
- QA/QC testing
- Laboratories
- Wastewater treatment

Outdoor Uses

- Landscaping
- Irrigation
- Particulate emission control
- Decorative fountains/ponds

Vehicle Washing

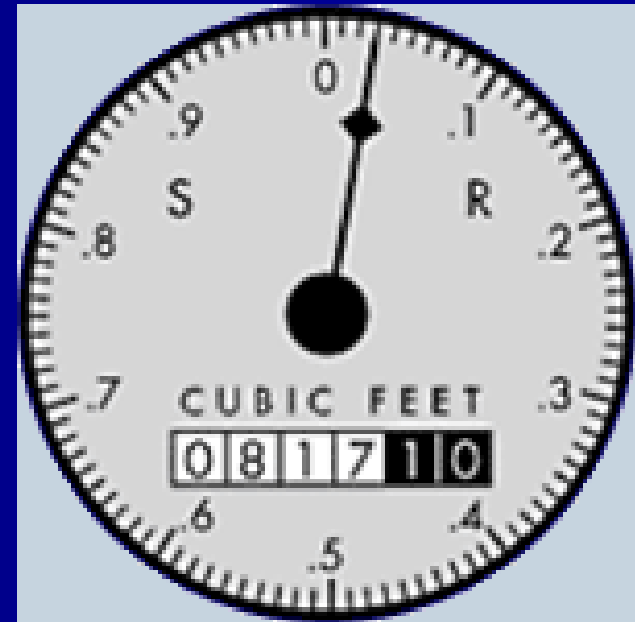
- Personnel
- Medical

Making the most out of the walk-through

- Set reasonable time expectations with client
- Use your tools – take photos, measure water flowrates,
- Schedule to observe water using operations
- Ask questions (talk to equipment operators, ok to split-up assessors)
- Verify information provided to you. It is not always accurate.

Reading Meters

In the meter shown, the reading is taken from under the words CUBIC FEET. The meter reads 81710.03 which is the total number of cubic feet of water recorded since the meter was installed. If the utility bills in units of 100 cubic feet they would read this meter as simply 817.



One cubic foot = 7.48 gallons 100 cubic feet (CCF) = 748 gallons

Water charges - typically based on 100 cubic feet or 1000 gallon units

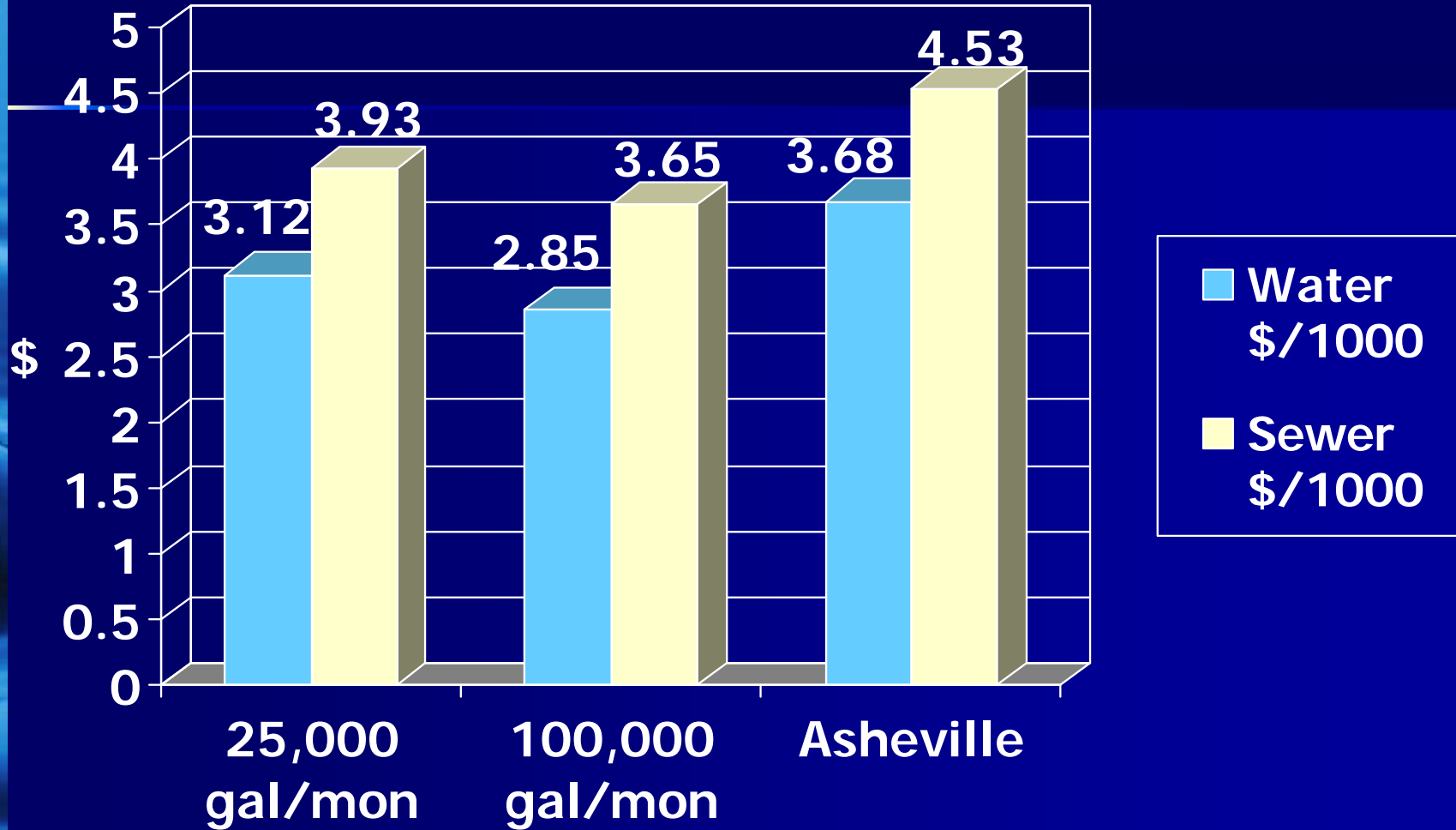
Reading Meters

This meter is also in cubic feet and is an example of a situation where the "ones digit" has already "turned over". The correct reading on this meter is: 2425.92 cubic feet. On most meters, the final digit will turn over once the big sweep hand has passed the 0.6 mark. Note that the size of the meter is usually printed on the dial. The meter size (5/8") is shown on the dial.



The red triangle spins with any use. Helpful in determining leaks

Median Water Costs in NC - 2006



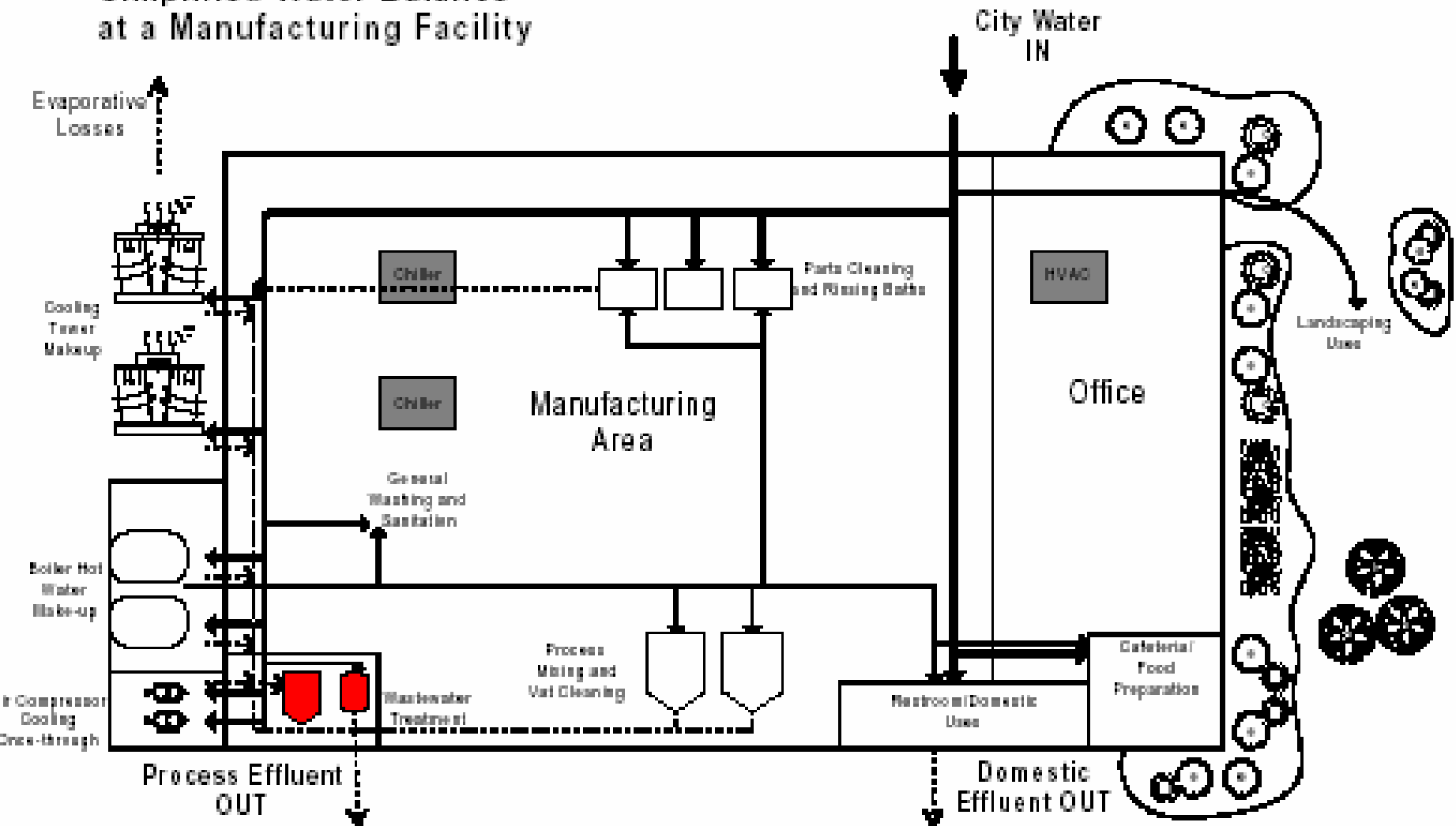
True Cost of Water

Example:
Metal Finishing
Operation
(not heated)

Activity	Unit Cost \$/CCF)
City water purchase	\$2.11
Sewer rate	\$2.43
Total Water/Sewer	\$4.54
Deionized using reverse osmosis	
Equipment	\$0.41
Energy	\$1.07
Labor	\$1.23
Total DI water	\$2.71
DI water (flexible cost @40%)	
\$2.71 x 40%	\$1.08
Wastewater treatment	
Sludge disposal	\$3.78
Treatment chemicals	\$2.64
Energy	\$0.25
Labor	\$6.01
Total wastewater treatment	\$12.69
WW treatment (flexible cost @40%)	
\$12.69 x 40%	\$5.07
Total cost of water	\$10.69/CCF
	\$14.29/1,000 gallons

Water Uses and Water Balance

Simplified Water Balance
at a Manufacturing Facility

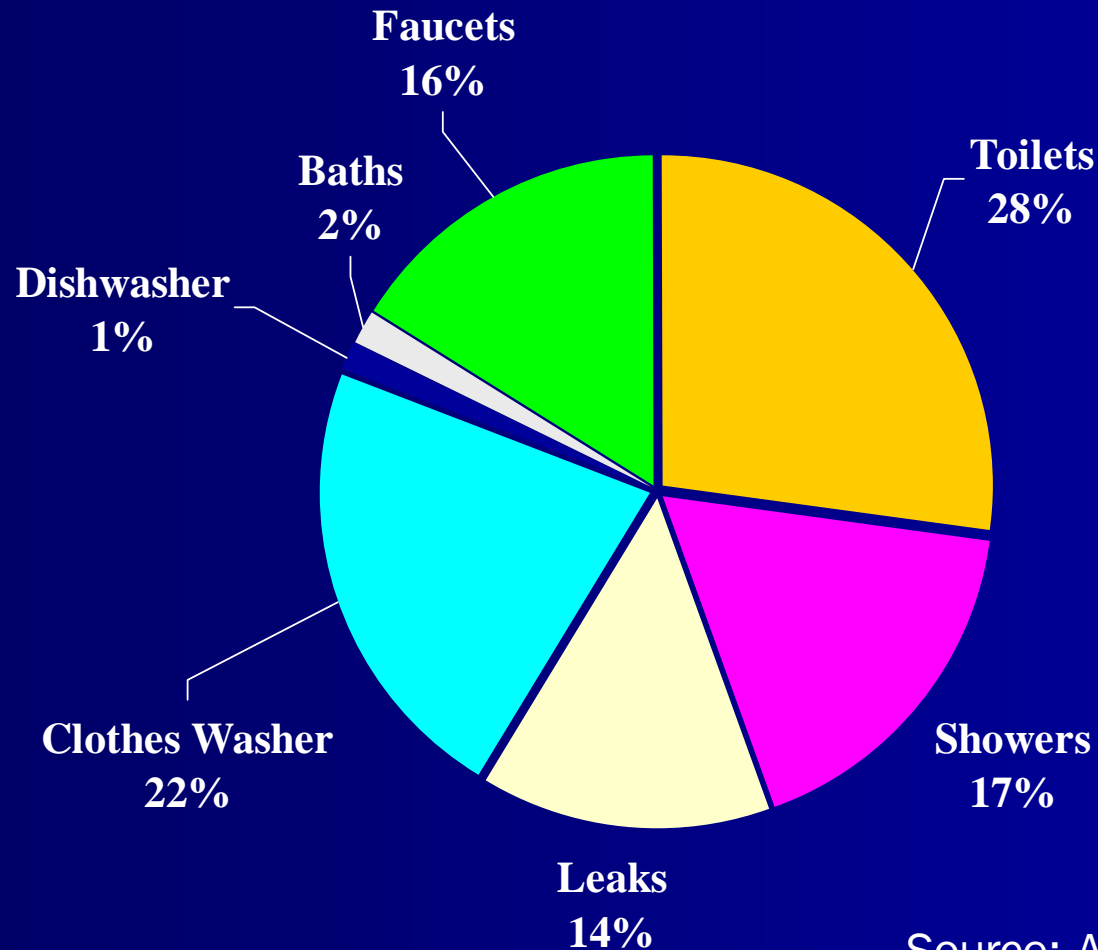


Water Balance - Residential

Average indoor water Use

Single-family non-conserving home

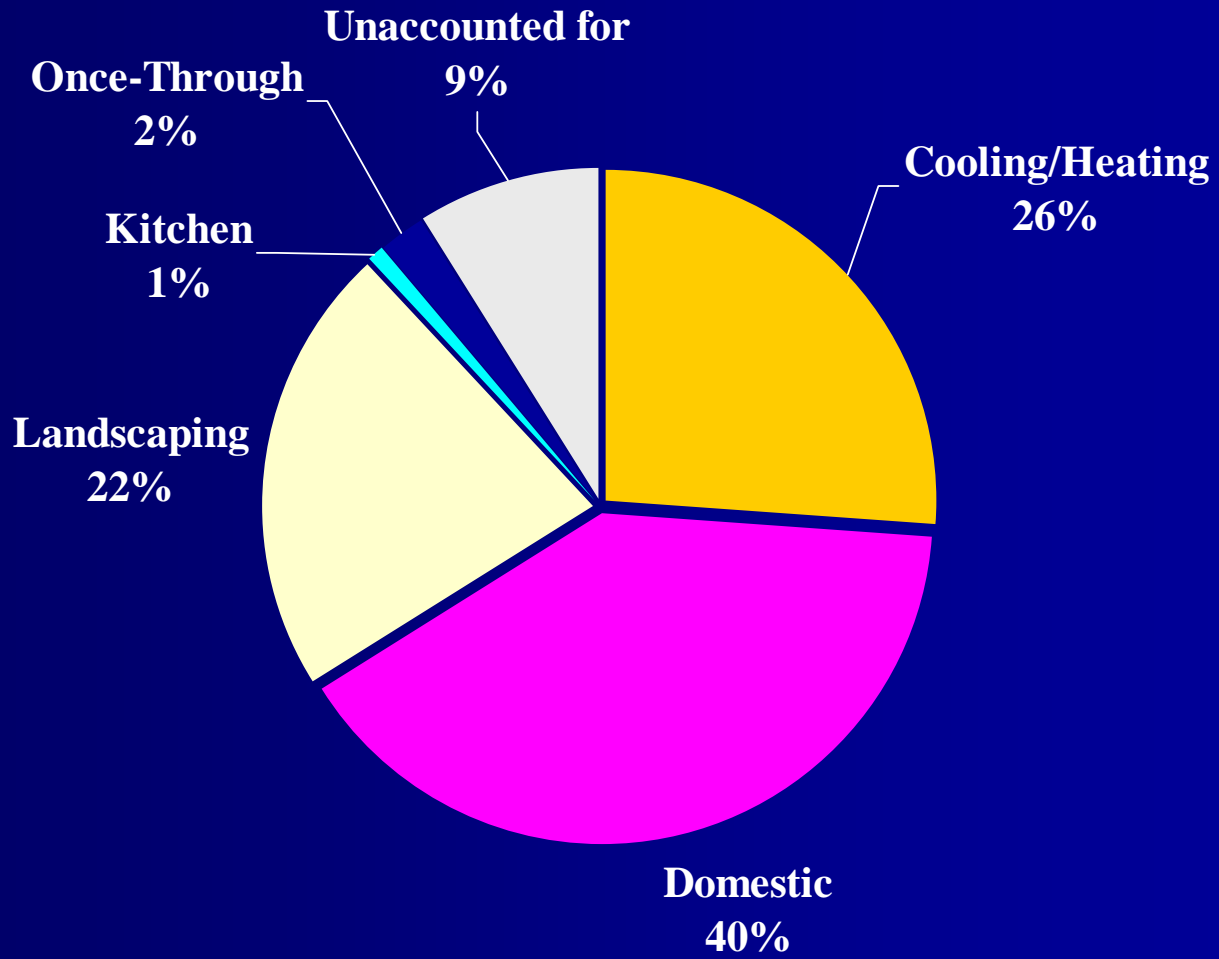
69.3 gallons per capita per day (gpcd) = 2.77 CCF/month




Source: AWWA, 1999

Water Balance

Office Setting Example



Water Management Options

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- A vertical decorative strip on the left side of the slide features a blue background with several water droplets. One droplet is in the process of falling, creating a crown-like splash, while others are suspended in the air or resting on the surface, reflecting light.
- Sanitary/Domestic
 - Cooling & Heating
 - Cleaning & Rinsing
 - In-process Reuse & reclamation
 - Kitchen/Food Preparation
 - Landscaping

Top Water Efficiency Measures

(survey of 902 commercial/industrial and institutional facilities in CA, 1997)

- 
- Recycle process water
 - Improve maintenance to replace misc. parts
 - Use domestic water efficiency measures
 - Change operational practices
 - Adjust cooling tower blowdown
 - Reduce irrigation time schedules
 - Adjust equipment
 - Repair leaks
 - Install spray nozzles
 - Install/replace automatic shut-offs
 - Reduce dishwasher loads
 - Turn off equipment when not in use

Goal: Concise Summary of Recommendations

XYZ Company: Summary of Potential Water and Cost Savings

Source	Reduction Measure	Gallons per Year (gpy)	Investment Costs (\$)	Savings (\$/yr)	Simple Payback (yr)
Electroplating	Conductivity controlled rinses (also see 5.1.2-4)	967,000	6,000	11,200	1.2
Lavatories	Faucet flow controls	679,000	270	4,100	0.1
Commodes	Replace with 1.6 gpf units	1,170,000	10,300	7,200	2.7
Urinals	Flushometer retrofit kits	151,000	100	900	0.8
Boiler Room	Repair leaks	131,000	50	800	0.06
TOTAL		3,098,000	\$48,700	\$24,200	2.0

Implementing Options

- Action Plan
- Time line
- Low-tech to high-tech approaches
- Good Communication & employee Awareness
- Employee Training

Resources for Water Efficiency Program, Assessments, Strategies

- Water Efficiency Manual for Commercial, Industrial, and Institutional Facilities, 2009
- Handbook of Water Use and Conservation, Amy Vickers, 2003
- WaterWiser - AWWA
- WaterSense – EPA
- Energy Star – EPA
- Trade Specific Publications

Resources

- **Technical Assistance & On-site Assessments (NC)**
NC Division of Pollution Prevention and Environmental Assistance – (919) 715-6500 www.p2pays.org
- **Technical Assistance (WNC)**
Waste Reduction Partners (828) 251-6622, web: www.landofsky.org/wrp
- **Fact Sheets, Checklists, Manuals, Posters**
www.p2pays.org/water/
- **WaterWiser, American Water Works Association -**
<http://www.awwa.org/waterwiser/>
- **EPA WaterSense Program**
<http://www.epa.gov/owm/water-efficiency/index.htm>

Waste Reduction Partners

Dedicated Professionals Sharing Expertise

Objectives:

- Improve environmental and energy management
- Provide innovative cost saving strategies & resources
- Promote pollution prevention

Clients: Business, Industry, Institutions & Public Entities

Services: Water & Energy Use Efficiency, Solid Waste Reduction, Pollution Prevention, ISO14001

Service Area: WNC (west of I-77)

Staff: Volunteer and retired engineers, scientists, and architects

Confidential - Non-regulatory - No-cost services

WASTE
REDUCTION
PARTNERS



dedicated professionals sharing expertise