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**Building A Case For**  
**Water Reuse**  
**In Commercial Buildings**  
***ASPE***

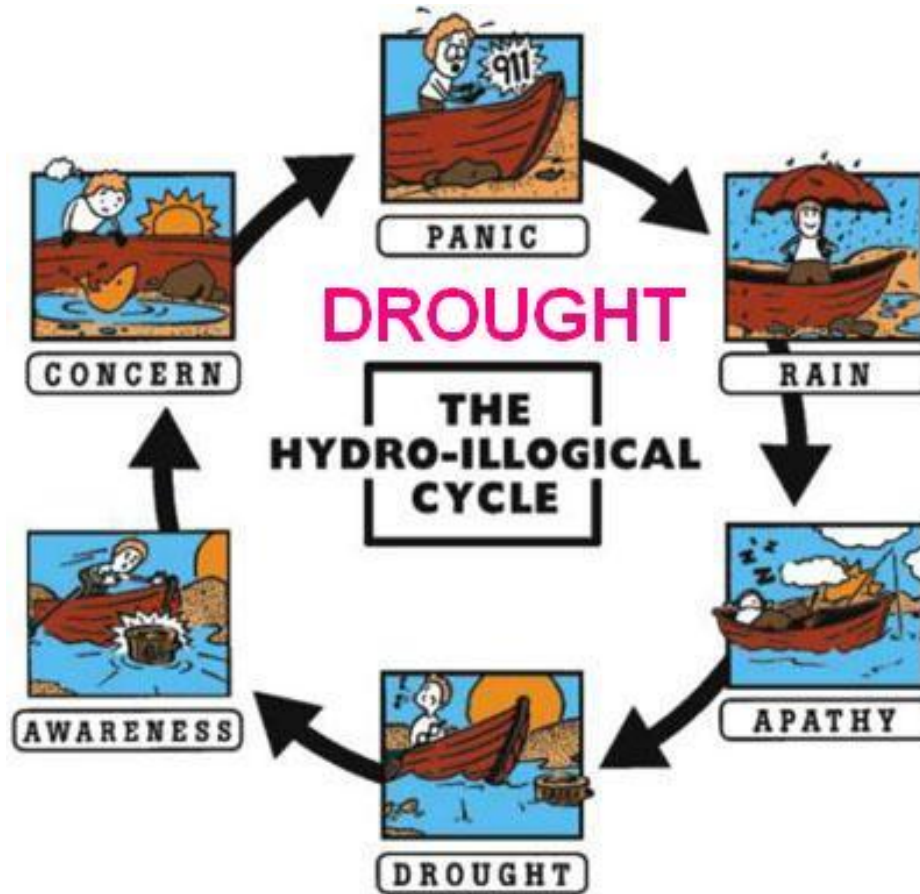
**Paul Riedinger, MBA, LEED AP BD+C**



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You can't beat the system.

# The Hydro-Illogical Cycle



# The State of the Water Industry

- Water is a precious resource



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# The State of the Water Industry

- **Three-fourths of the earth is covered by water.**
  - **Oceans (salt water) make up 97 percent of the earth's water**



# The State of the Water Industry

- **Three-fourths of the earth is covered by water.**
  - **Glaciers and ice caps make up 2 percent**



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# The State of the Water Industry

- Three-fourths of the earth is covered by water.
  - Fresh water makes up **ONLY 1 percent.**



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# The State of the Water Industry

“Unquenchable”, Robert Glennon

- Orme , TN ran out of water
- Had to truck in water from AL



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# The State of the Water Industry

“Unquenchable”, Robert Glennon

- Hundreds of workers lost their jobs at a SC paper plant because of low water levels



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# The State of the Water Industry

“Unquenchable”, Robert Glennon

- Colorado farmers watch their crops wither because of low rain and no water source for irrigation



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# Texas 2011



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# The State of the Water Industry

**“Unquenchable”, Robert Glennon**

- **Scientists at the Scripps Institute of Oceanography predict that Lake Mead could dry up by 2021**
  - **Serves 22 million people.**



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# The State of the Water Industry

“Unquenchable”, Robert Glennon

- Atlanta came within three months of running out of water
- They banned watering lawns, washing cars & filling swimming pools



PHOTOS COURTESY OF JEN PAIRE.

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# The State of the Water Industry

“Unquenchable”, Robert Glennon

- Charlotte watering bans for several years due to water shortages.



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# The State of the Water Industry

“Unquenchable”, Robert Glennon

- The NRC rebuffed Southern Nuclear from opening two new nuclear reactors in GA due to water shortages.

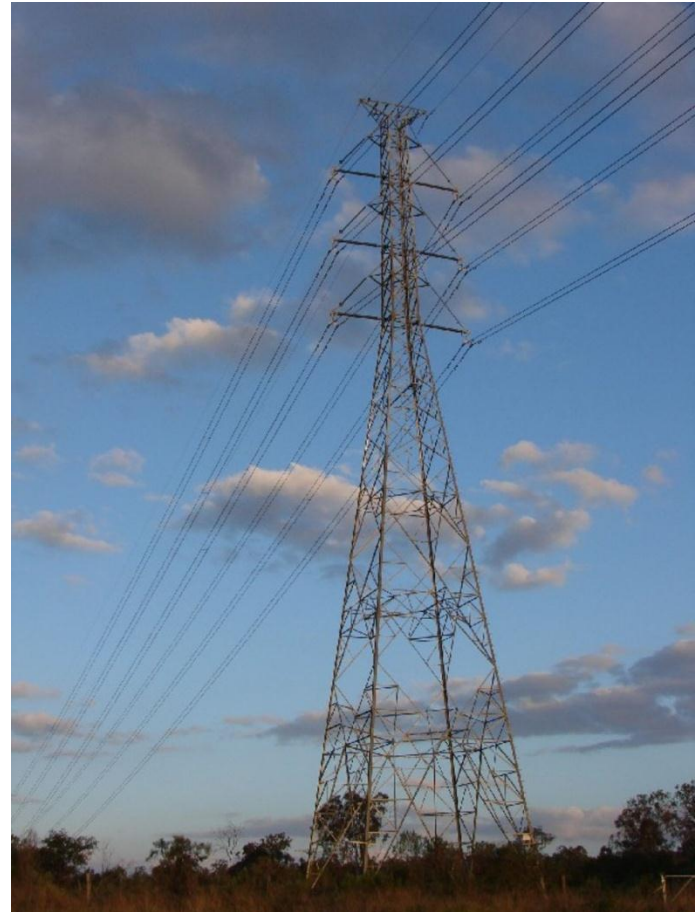


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# The State of the Water Industry

**“Unquenchable”, Robert Glennon**

- **Coal-fired power plants shelved in Idaho, Arizona and Montana because of water shortages**



# The State of the Water Industry

- Small percentage of our primary water supply is actually used for drinking.



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# The State of the Water Industry

- Small percentage of our primary water supply is actually used for drinking.
- **Most individuals drink less than a gallon a day**



# The State of the Water Industry

- 130 gallons of water per capita per day in US
- Most of it used where the water doesn't have to be treated to highly exacting drinking water standards

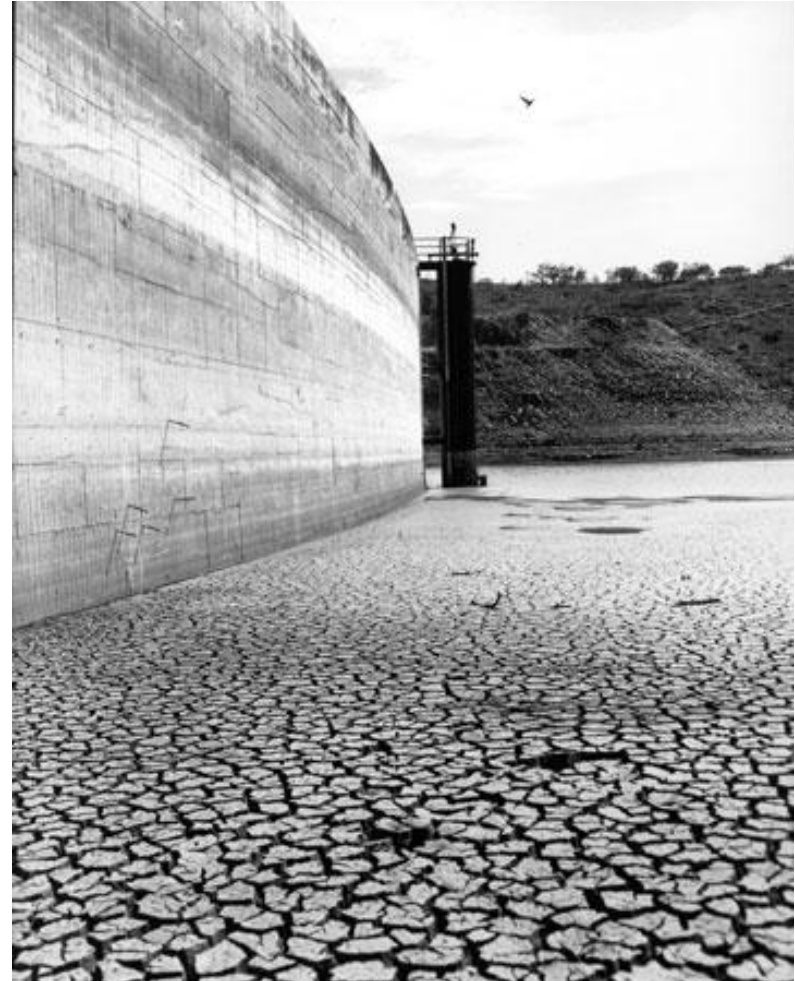


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# Potable Water Usage

**50% - 90 % of all potable water**

- 1. Irrigation**
- 2. Industrial**
- 3. Toilet/Urinal**



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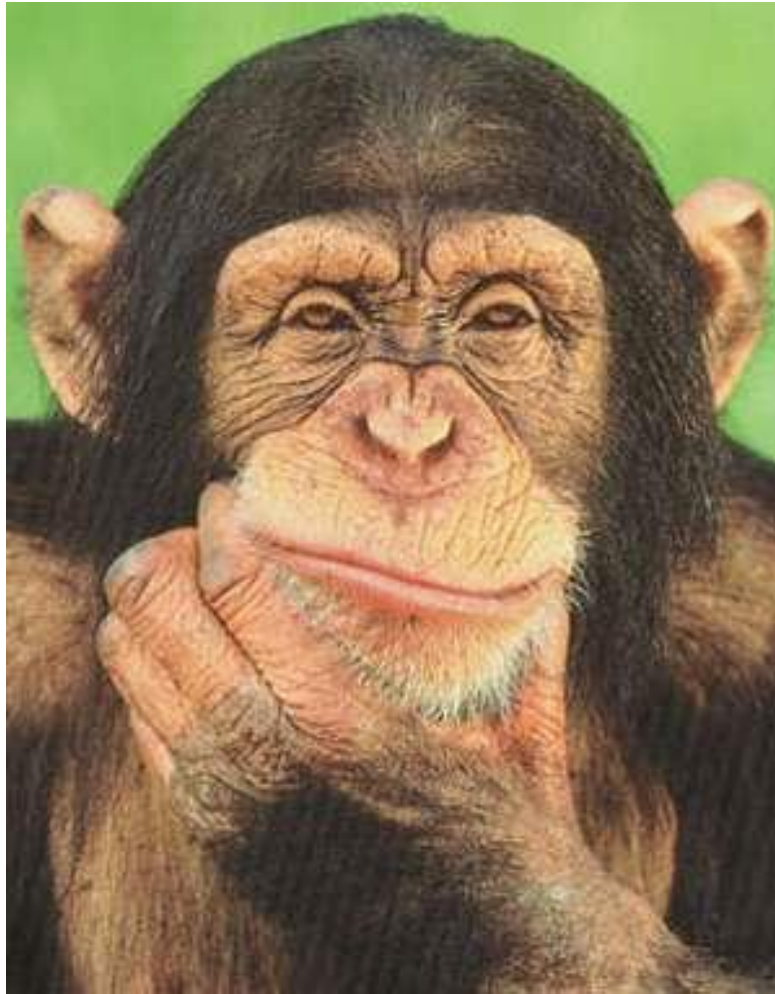
# The State of the Water Industry

**"Whiskey is for drinking. Water is for fighting over."** Mark Twain



**Fight for the Water Hole by Frederic Remington**

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# Solutions

# More Efficient Use of Water Modern Fixtures

- Toilets
- Urinals
- Showerheads
- Faucets
- Metering Faucets
- Commercial Faucets
- More Efficient Dishwashers and Washing Machines



# More Efficient Use of Water

- Replace or repair Leaking Faucets and Fixtures
- Repair Leaking Pipes and Fittings
- Update Low Flow Aerators on Faucets
- Automated Faucets and Fixtures



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# Consider Reusing Water



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# Water Reuse: Rainwater & Gray Water

- Toilet and urinal flushing



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# Water Reuse: Rainwater & Gray Water

- Fire protection



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# Water Reuse: Rainwater & Gray Water

- Decorative fountains and other water features



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# Water Reuse: Rainwater & Gray Water

## – Irrigation



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# Water Reuse: Rainwater & Gray Water

- Process water



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# Water Reuse: Rainwater & Gray Water

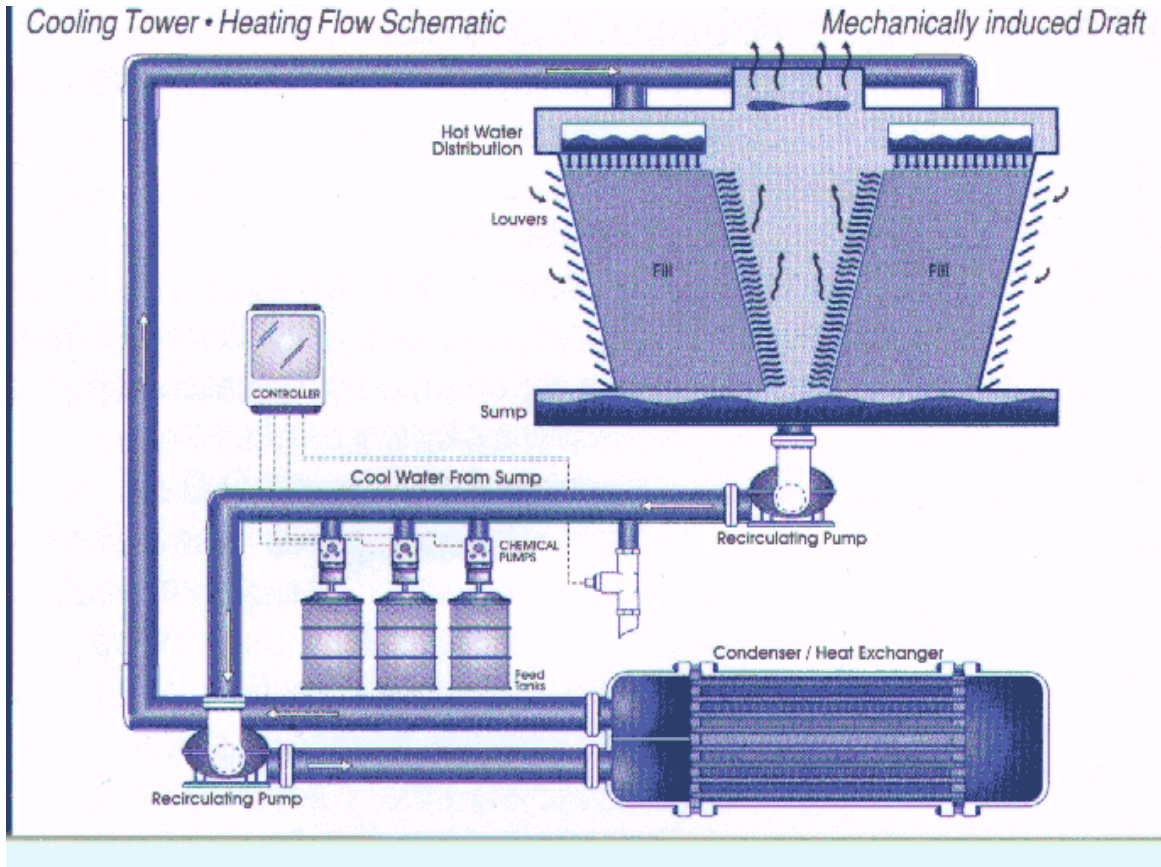
- Bus and car washing



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# Water Reuse: Rainwater & Gray Water

- Cooling tower make up water



# Water Reuse: Rainwater & Gray Water

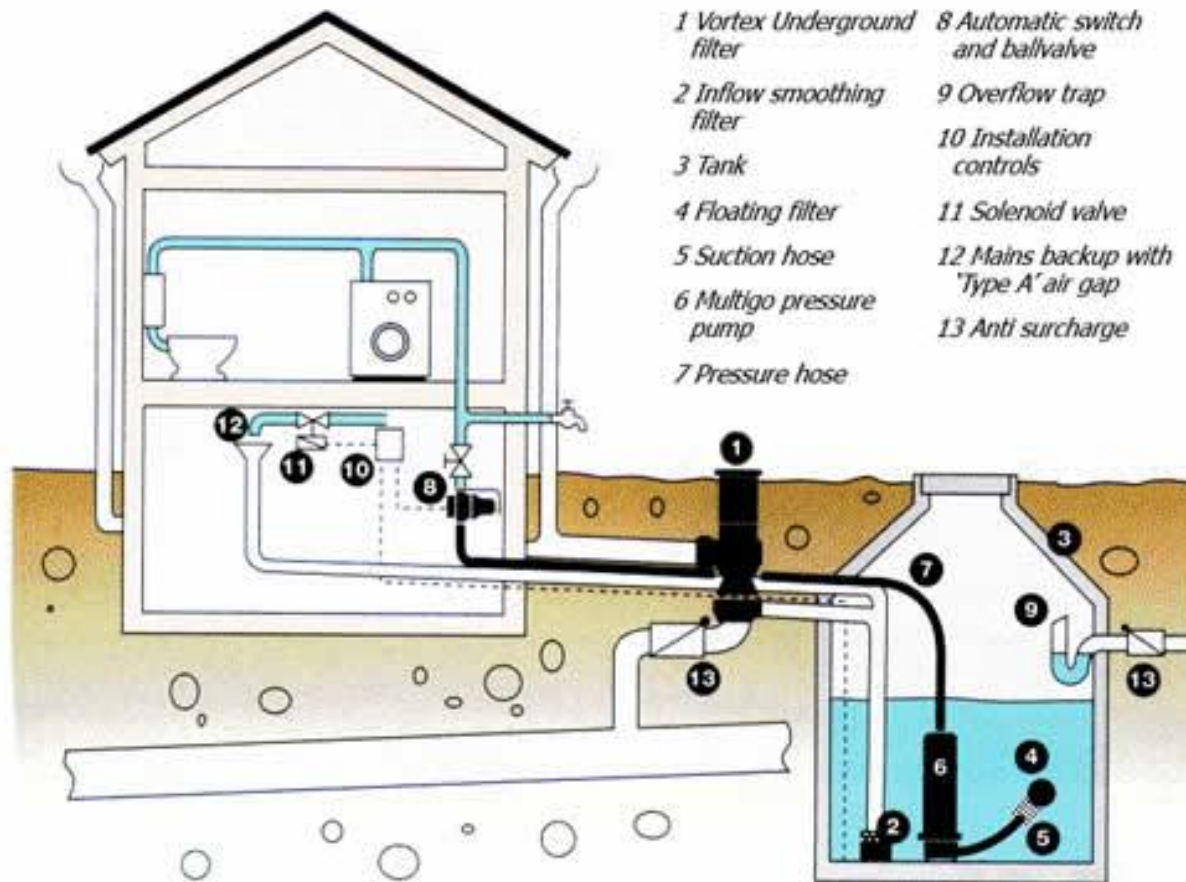
- Pool water



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# Rainwater Harvesting



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# Rainwater Systems

- Can Help with Volume Control
- Reduce the Cumulative Effect of Stormwater on Downstream Systems



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# Rainwater Systems

- Provide Remarkably Soft Water
- No Need For Water Softeners
- Less Soaps Required



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# Gray Water Reuse

- From lavs, tubs, showers, clothes washers and laundry tubs
- Untreated household waste water that has not come into contact with toilet waste
- **NOT** waste water from kitchen sinks, dishwashers, water closets or urinals



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# Gray Water Reuse

## Reuse Cooling Tower Blow-Down Water



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# Reclaimed/Recycled Water

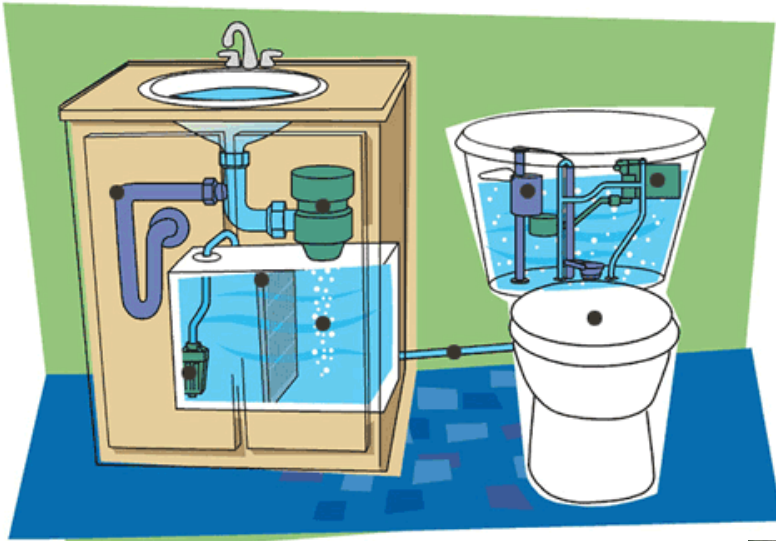
- Supplied by a public agency with EPA quality standards
- Highly regulated
- Mandated use in some communities as a second tap
  
- Requires Massive Energy
- Requires Massive Money



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# Some Combination of Water Supplies for Future Buildings (Smart Building?)



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# LEED®

- **LEED Green Building Rating System™**
- **Prerequisites and credits address 7 topics, one of which is Water Efficiency (WE)**
- **LEED Certifications are based on the following scale**
  - **Certified 40-49 points**
  - **Silver 50-59 points**
  - **Gold 60-69 points**
  - **Platinum 80 points and above**



# LEED®

- **Easy WE Points Are Gone**



# LEED 2012 (Draft)

- Utilizing reuse water for applications such as irrigation, toilet and urinal flushing and cooling tower make up water.



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# LEED 2012 (Draft)

- **LEED is also looking to redefine the description of water as a resource instead of stormwater as a management problem. The draft version of the new LEED takes two stormwater credits from LEED 2009 and rolls them into a single credit.**

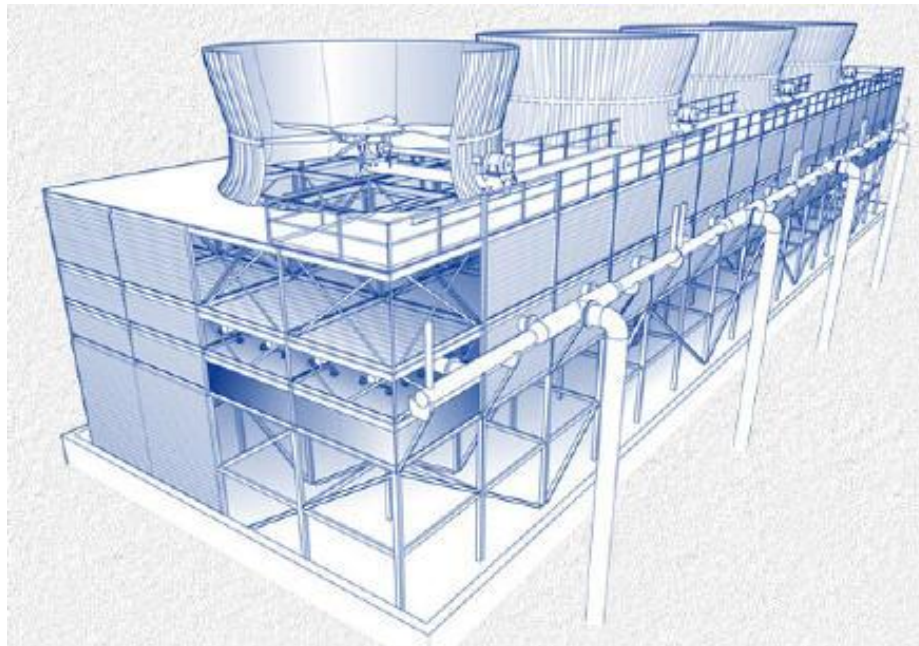


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# LEED 2012 (Draft)

- This fits nicely into the new proposed WE credit, Cooling Tower Makeup Water, where water reuse would be a positive effect on water efficiency and overall reduction of water use.



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# Road Blocks



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# Code Issues

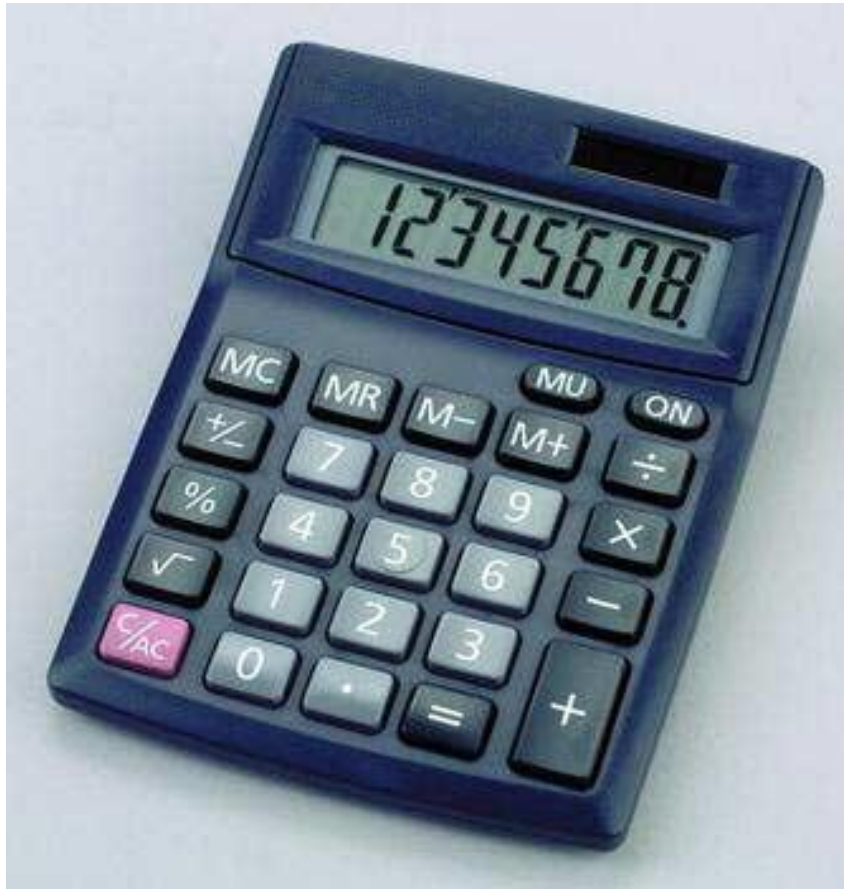


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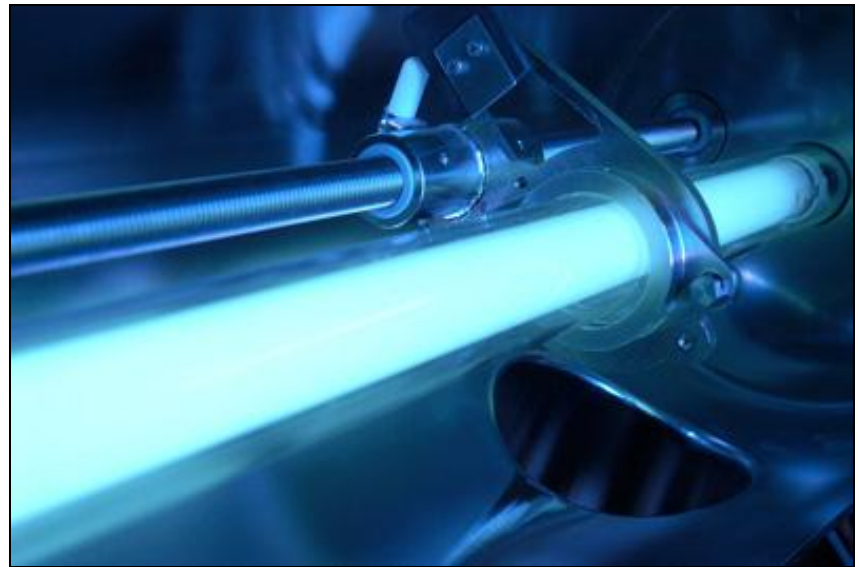
# The Issue of Cost

- Reuse System Too Expensive



# The VE Dilemma

- Water treatment system can be expensive \$30K-\$200K+





# The VE Dilemma

- Water storage can also be expensive



# Operating Costs

- Lower water bills
- Lower sewage bills
- PM required
  - Fits well into LEED document manuals



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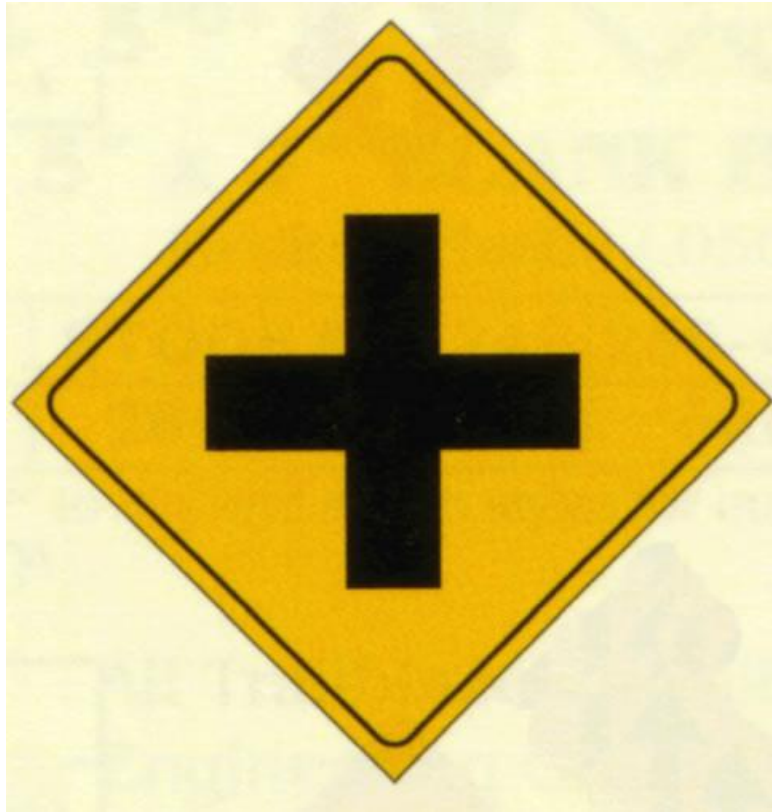
# Are These Systems Economically Viable?

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**Are These  
Systems  
Economically  
Viable?  
Maybe,  
Maybe Not**

# Four Water Reuse Drivers



1. **Green client**
2. **Water supply problems**
3. **Integrating stormwater BMP**
4. **Rising water costs**

# 1. Green Customer



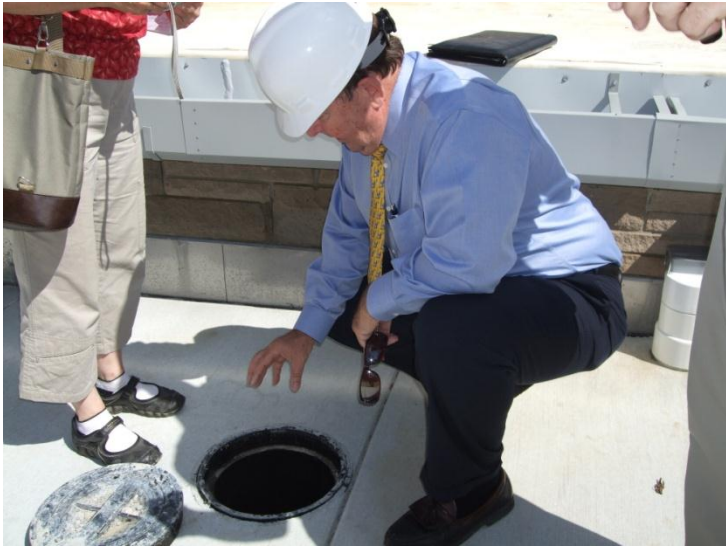
Monroe County Community School Corporation  
Transportation Building, Bloomington, IN  
MEP Design-Aire, Indianapolis, IN Bob Boulware

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- 15,000 gallons per month
- \$25K added costs



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**Bus Washing**

**Softer water**

**Less soap used and sent  
downstream**



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# Another Green Customer



Keithshire ES, Lexington, KY  
CMTA Engineers

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- 76K Square Feet
- RWH System
- Solar Energy Panels
- Solar Hot Water
- Permeable Pavers



Keithshire ES, Lexington, KY

\*Not a LEED project

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# 2. Water Supply Problems



Ryerson Forrest Preserve Welcome  
Center  
Riverwoods, IL



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# \$1M To Provide Muni Water To Visitor Center

- **Strategies**
  - Fire Protection
  - Toilets/Urinals
  - Irrigation



Ryerson Forrest Preserve Welcome Center

Riverwoods, IL

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# Using Condensate H2O Rice University

- **A/C Condensate**
- **12 M Gallons/Year**
- **5-6% Annual Consumption**
- **\$80-100K Savings/year**



# 3. Water Reuse as a Stormwater Best Management Practice\*



- Using reclaimed water in cooling towers provides quickest ROI
- Cooling towers are typically the largest consumers of water in buildings

\*2011 LEED recently out for comment WE credit, Cooling Tower Makeup Water, where water reuse would be a positive effect on water efficiency and overall reduction of water use

# 4. Increasing Water Fees and Prices



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# Increasing Water Fees and Prices

- **Smaller municipal water impact fees possible**

## Example #1:

### – Austin, TX example:

- 2" water impact fee \$9,000
- 4" water impact fee \$30,000
- 6" water impact fee \$57,800



- **Austin also offers a significant savings for tapping Reclaimed water.**



# Increasing Water Fees and Prices

## Example #2:

- Columbus, OH example:
  - 2" water impact fee \$16,000
  - 4" water impact fee \$51,000
  - 6" impact fee \$102,000



# Increasing Water Fees and Prices

## Example #3

- **Gwinnett County, GA example:**
  - **2” water impact fee \$36,000**
  - **4” water impact fee \$100,000**
  - **6” water impact fee \$317,000**



# Increasing Water Fees and Prices



## Example #4

- Littleton, CO example:
  - 2" water impact fee \$40,000 to \$45,248
  - 4" water impact fee \$180,000 to \$203,000
  - 6" water impact fee \$470,000 to \$581,000

# Escalating Water Costs

The cost of water in the United States is going up

- Up 27% between 2002 and 2007\*
- Many communities water has nearly doubled from 2005-2010
- Water prices increasing faster than oil prices



\* Water Prices Rising Worldwide, Edwin H. Clark, II

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# Escalating Water Costs

EPA Mandates - \$ Billions



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# Escalating Water Costs

- Cost to transport water



*Energy Intensive Process*

*4-6% of All US Energy Costs to Treat & Move Water*



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# New Mexico



- **40% of New Mexico's Energy is Used to Treat and Deliver Water**

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# Escalating Water Costs



- Total demand



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# Escalating Water Costs

- Price subsidies: 40% municipalities worldwide **Do Not** charge enough to meet basic operations & maintenance.
- This is changing



# Aging Water Infrastructure



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# Aging Water Infrastructure: Chicago

- 600 miles of pipe that are over 100 years old
- Existing mains are leaking 25% of the water they carry
- 250 million gallons of water due to leaks EVERY day.



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# Pricy Water Infrastructure

- Treatment
  - AWWA: \$500B to \$1T next 20 years in The United States
  - Energy Costs continue to rise
  - Material Costs continue to rise



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# 24 Water Bills Currently Before Congress



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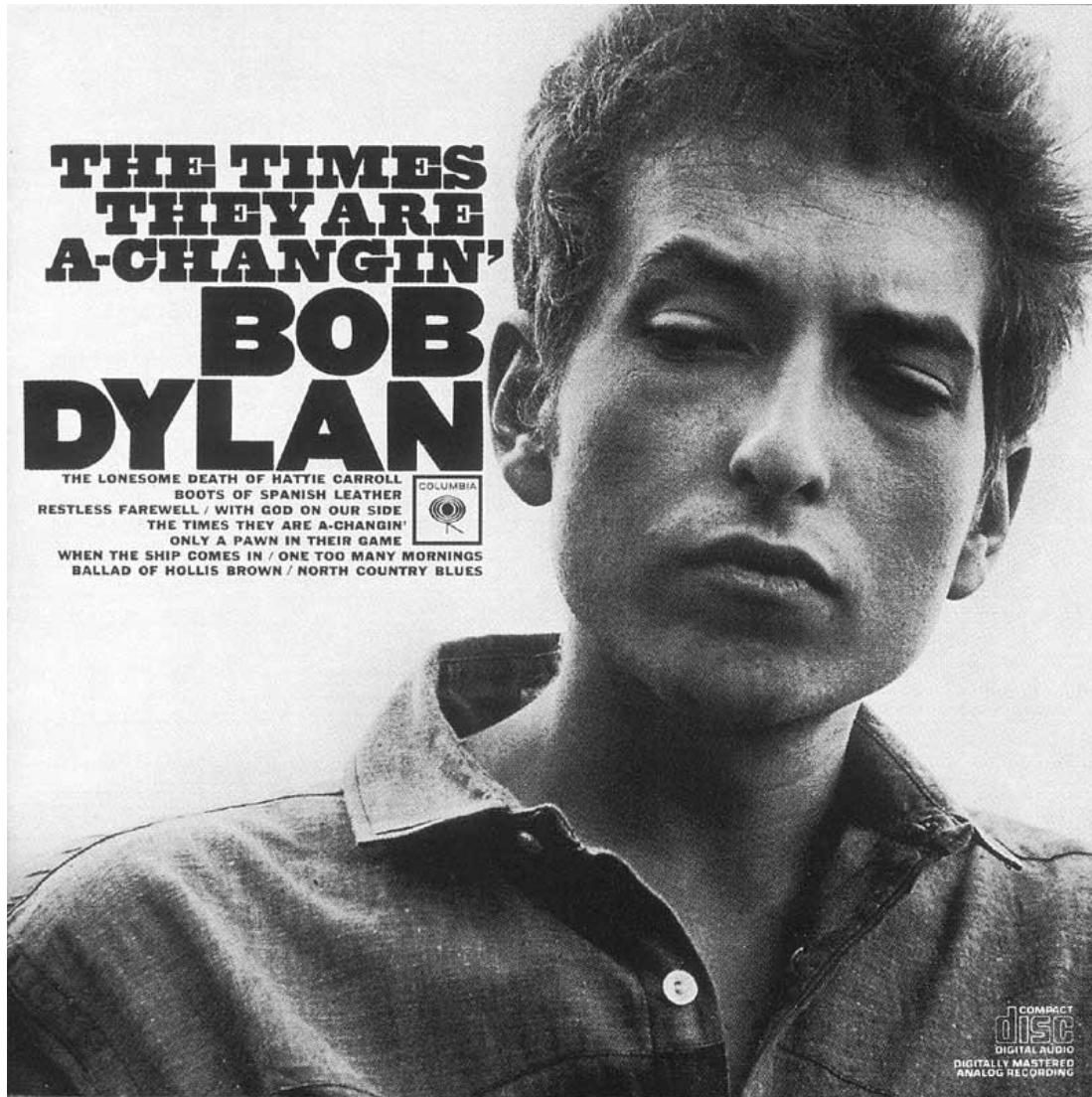
# Cheap Water Today



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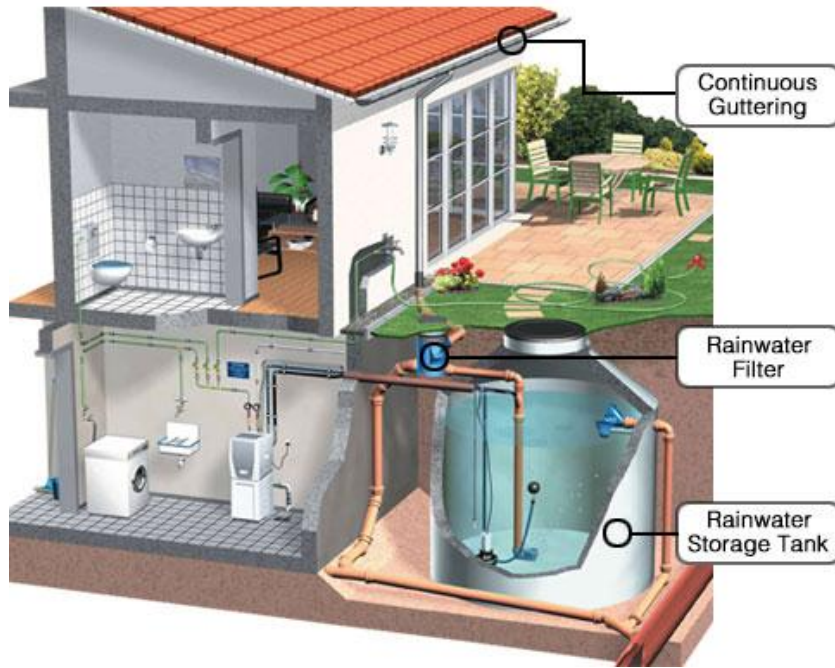
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# Cheap Water? How Much Longer?



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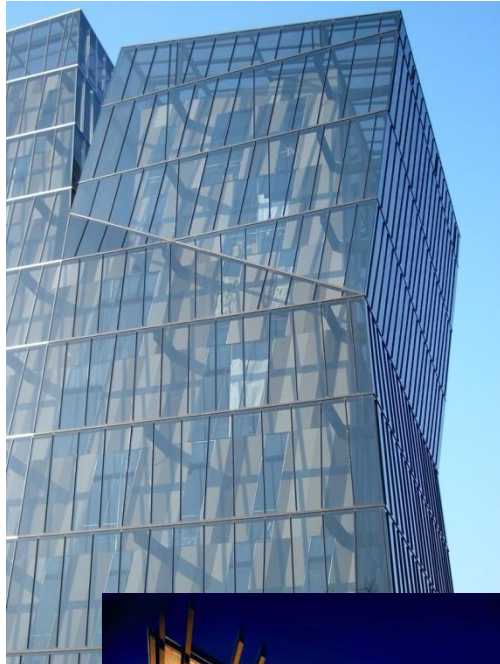
# Can These Systems Be Viable?

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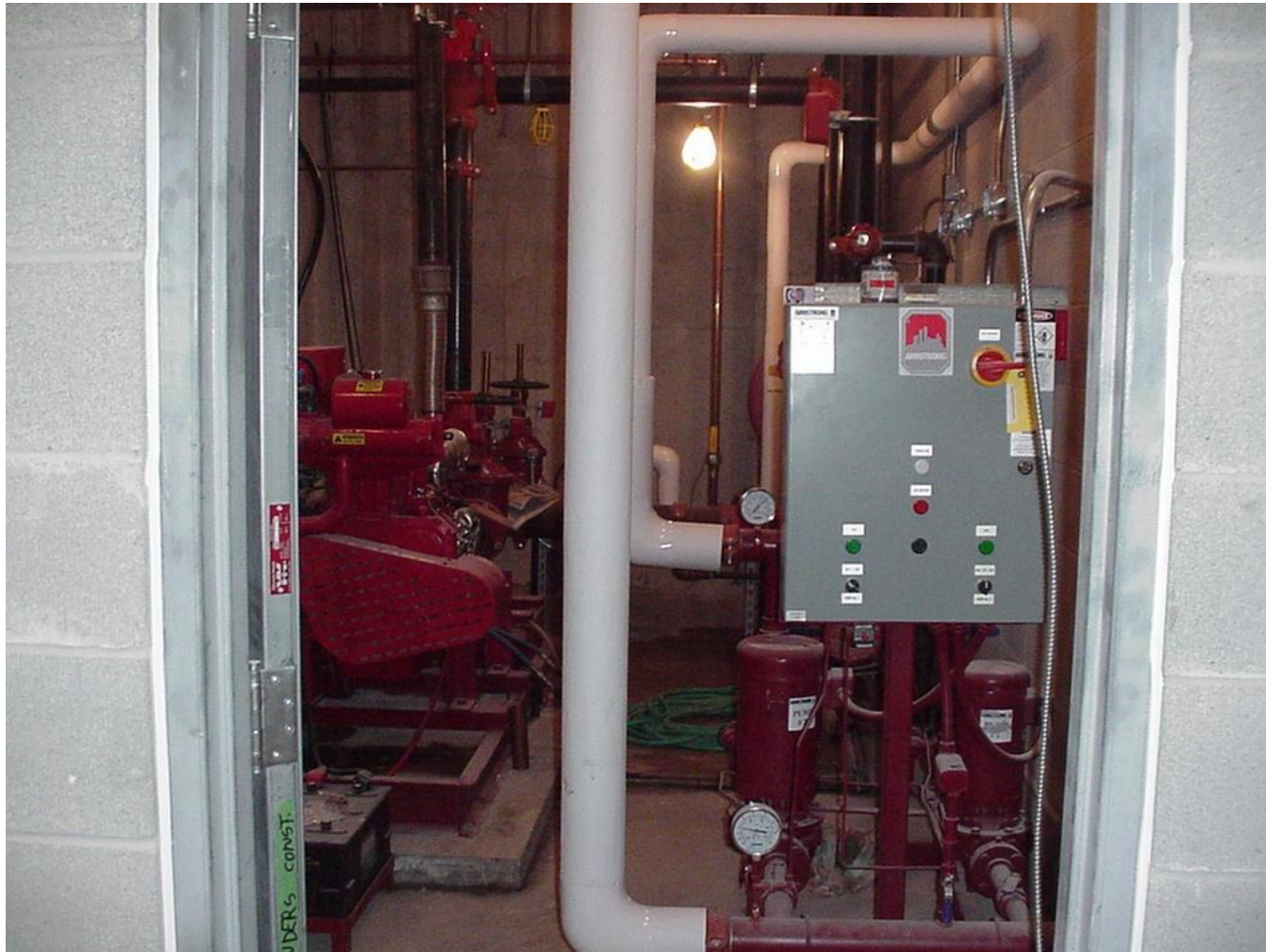
# What Do We Focus On?



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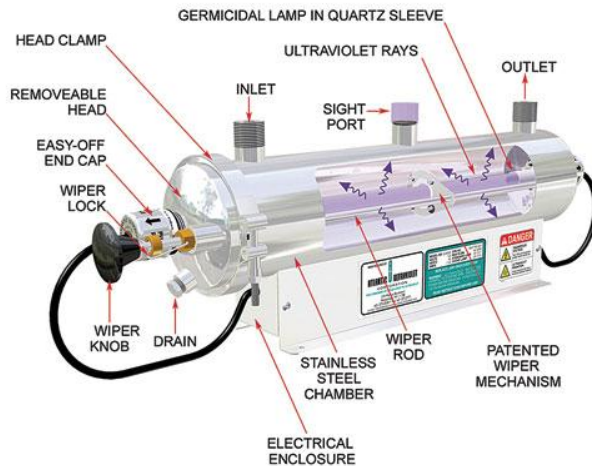
# What Do We Tend To Ignore?



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# What Should We Consider?



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# What Can You Do?



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# Make Your Project or Home More Water Efficient



## Water Efficient



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# Get Involved



**AMERICAN RAINWATER CATCHMENT  
SYSTEMS ASSOCIATION**

[www.arcsa.org](http://www.arcsa.org)

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# Spread the Word



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# What Is Charlotte Pipe and Foundry Doing?



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# Saving Water

- CP&F recycles more than **17 million** gallons of water every week.
- Store and recycle and reuse storm water runoff.



**Charlotte Pipe and Foundry  
Water Treatment**

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# Charlotte Pipe ReUze™



Rainwater, Gray Water  
and Reuse Water

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# What is ReUze™?

- Purple Pipe Used to Convey Non-Potable Water Inside of a Building
- With FlowGuard Gold®
  - Utilizes Low VOC Cement



# Why is it Purple?

- Identifies non-potable water
  - Language barriers
  - Illiterate
  - Dyslexic



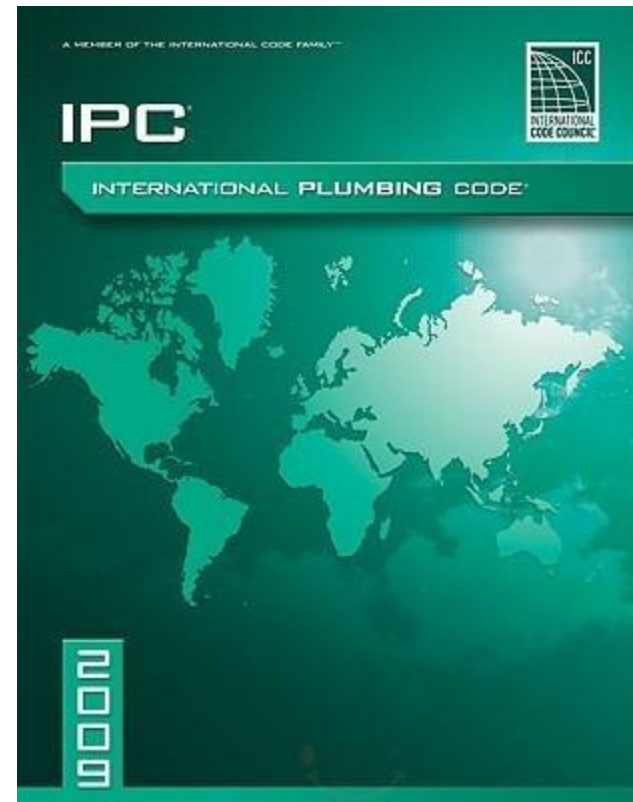
and...

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# Why is it Purple?

**2009 IPC, 608.2.2**

**“Purple shall be used to identify reclaimed, rain and gray water distribution systems”**



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# Why use ReUze?

- Reduced Condensation



- ReUze™ easily adapts to fixtures
- Ease of Installation
- Low VOC Cements
- Simple to design



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# Why use ReUze?

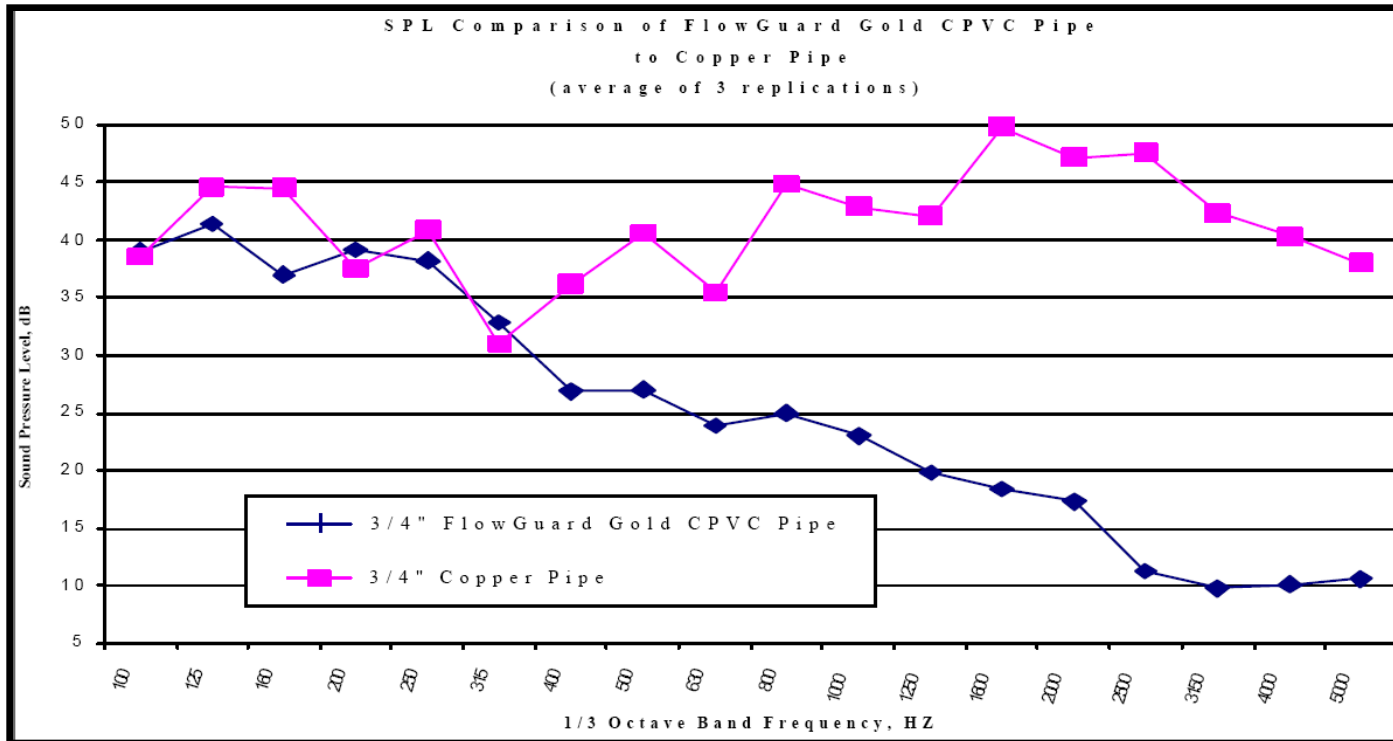
- **ASTM E 84 Plenum Rated**



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# Why use ReUze?



- Quiet Operation
- No need to insulate ReUze
- 50+ year history of successful installations

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# Widely Specified and Used Charlotte Pipe CPVC



**HOTELS & RESORTS** *Holiday Inn*



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# What Will You Do?



 ReUze

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