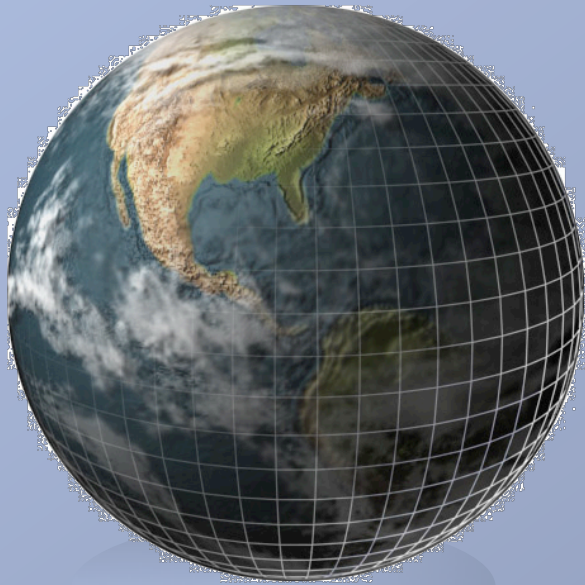


Connecticut Green Hospitality Workshop



Real Life Examples of Successful Water Savings in Hotels



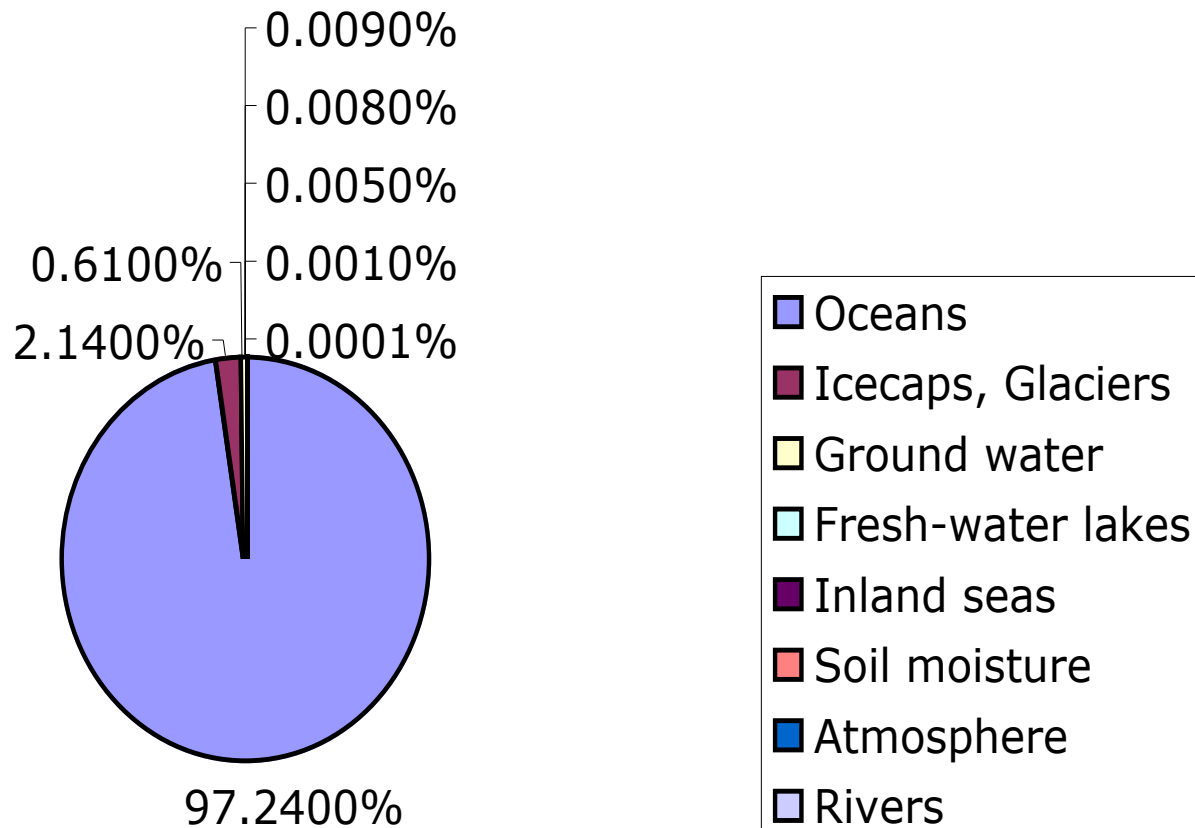
Presentation by:

Daniel Cook

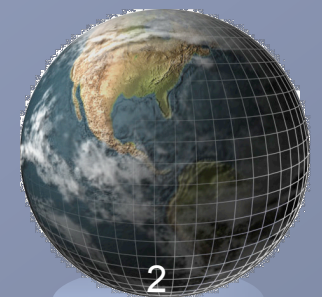
Conservation Solutions Corporation

Water Efficiency Division

World Water Sources



Where
is the
Water?



“Water promises to be to the 21st century what oil was to the 20th century - The precious commodity that determines the wealth of nations”

Fortune Magazine

Agriculture Uses Lots of Water **WORLD GRAIN PRODUCTION HAS TRIPLED FROM 1950 TO 2000**



- **It Takes 1000 Tons of water to grow a ton of wheat** (250,000 gallons)



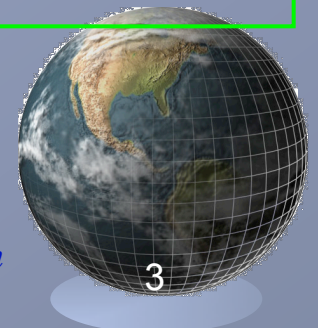
- **1200 tons of water to grow a ton of rice** (300,000 gallons)



- **750 tons of water to grow a ton of corn** (187,500 gallons)

- **When Countries Import Food They Also Import Significant Water Supplies**

“When the well’s dry, we know the price of water”
Benjamin Franklin



Water Water Everywhere but Less and Less to Drink

Groundwater as a Share of Drinking Water Use, by Region

Share of Drinking

Water from Groundwater

People Served Region

(percent)

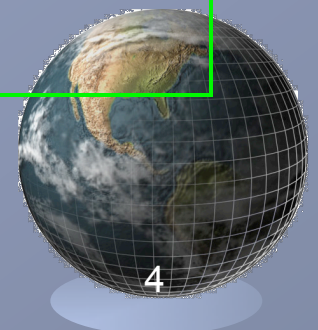
(Millions)

| | | |
|---------------|---------------|------------------|
| Asia-Pacific | 32% | 1,000 to 1,200 |
| Europe | 75% | 200 to 500 Latin |
| America | 29% | 150 |
| United States | 51% | 135 |
| Australia | 15% | 3 |
| Africa | not available | not available |
| World | | 1,500 to 2,000 |

Source: World Watch Institute

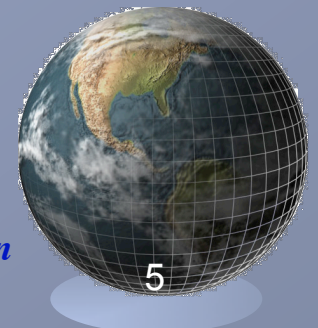
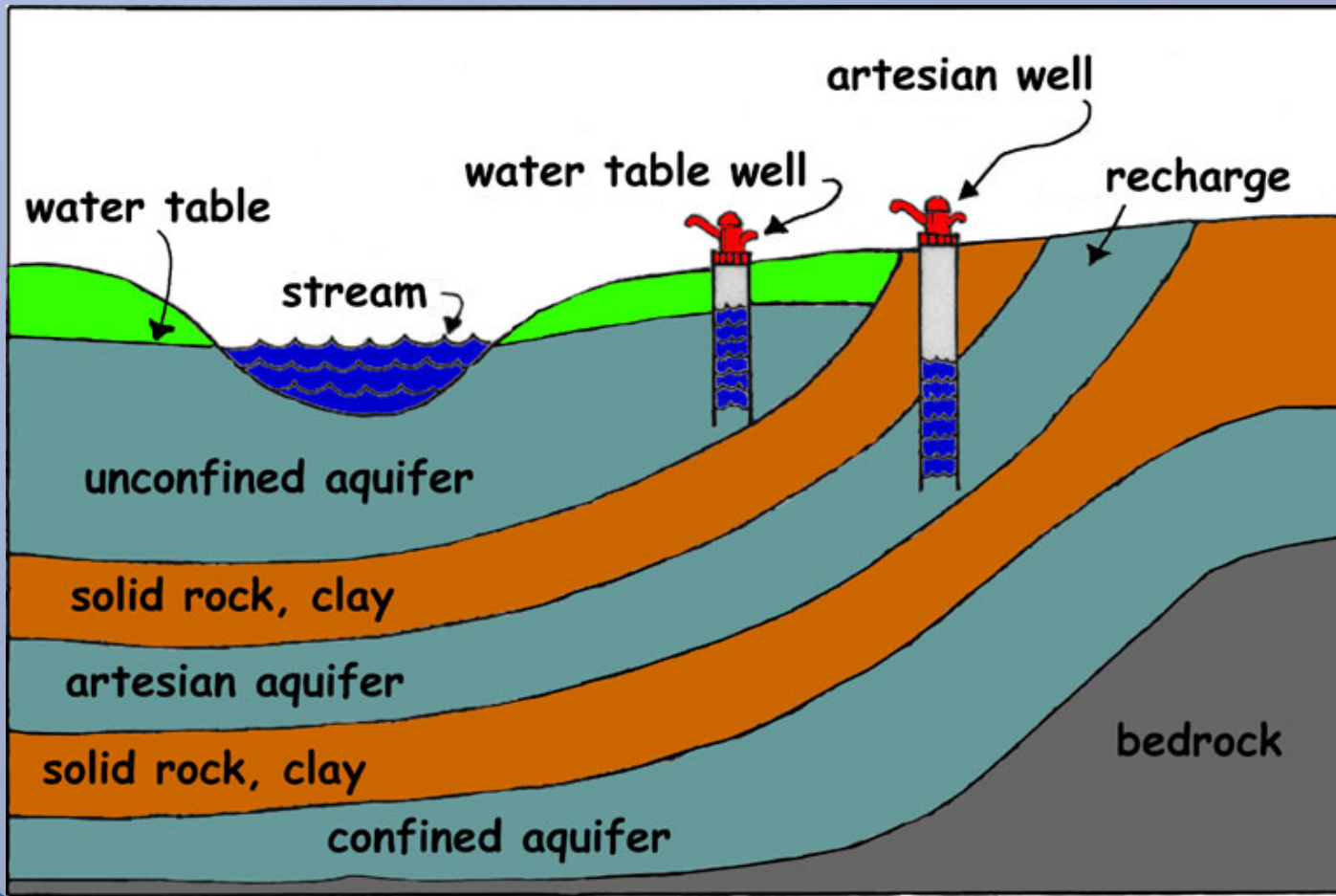
“If the wars of the last century were fought over oil,
the wars of the next century we will fought over water”

World Bank VP Ismail Serageldin



Aquifers - Groundwater Resource

“Whiskey is for drinking, water is for fighting”
Mark Twain



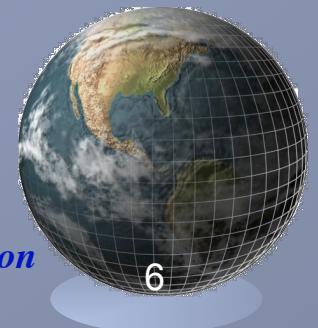
Some Notes on Agriculture



- **Surface aquifers can be recharged naturally**
- **Fossil aquifers can not be recharged naturally**
- **What happens when the fossil aquifers are depleted in countries with large and growing populations?**

From mid-2006 to mid-2008, world grain prices of wheat, rice, corn and soybeans roughly tripled, reaching historic highs. It wasn't until the global economic crisis Beginning in 2008 that grain prices receded somewhat.

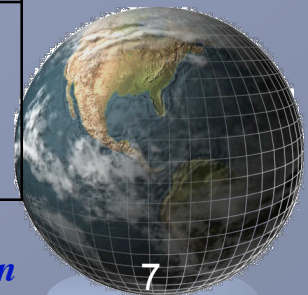
Lester Brown – Plan B 4.0 Mobilizing to Save Civilization



Selected Examples of Aquifer Depletion

| Country | Region | Description of Depletion |
|----------------------|---|---|
| China | North China Plain | Water table falling by 2–3 meters per year under much of the Plain. As pumping costs rise, farmers are abandoning irrigation. |
| United States | Southern Great Plains | Irrigation is heavily dependent on water from Ogallala aquifer, largely a fossil aquifer. Irrigated area in Texas, Oklahoma, and Kansas is shrinking as aquifer is depleted. |
| India | Punjab, Haryana, Rajasthan, Andhra Pradesh, Maharashtra, Tamil Nadu, and other states | Water tables falling by 1–3 meters per year in some parts. In some states extraction is double the recharge. In the Punjab, India's breadbasket water table falling by nearly 1 meter per year. |
| Mexico | State of Guanajuato | In this agricultural state, the water table is falling by 1.8–3.3 meters per year. |
| Pakistan | Punjab | Water table is falling under the Punjab and in the provinces of Baluchistan and North West Frontier. |
| Iran | Chenaran Plain, northeastern Iran | Water table was falling by 2.8 meters per year but in 2001 drought and drilling of new wells to supply nearby city of Mashad dropped it by 8 meters. |

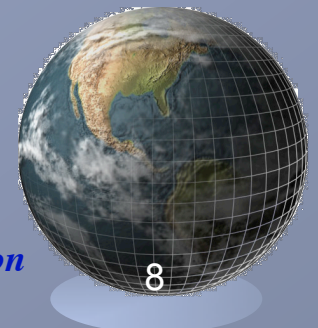
India & China represent about 38% of world population



Water Conservation Opportunities

- **What do we mean by Water Conservation?**

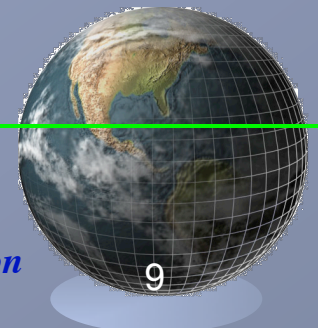
The replacement of inefficient water consuming fixtures with more efficient replacements or retrofits that generate financial savings or reduced operating costs from water, sewer, energy and chemical reductions





Water Conservation Opportunities

- Why Water Conservation Makes a Difference.
 - a.) Capital Improvement with a relatively short payback.
 - b.) Immediate reduction in Operating Expenses.
 - c.) Often has significant impact on energy costs.
 - d.) With Water & Sewer Rates constantly increasing,
everyone needs help!!





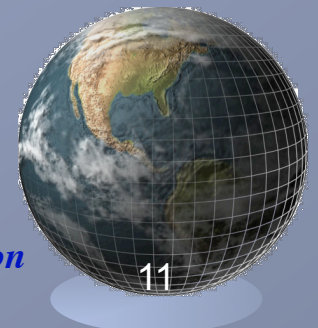
Water Conservation Opportunities

- a. Typical Savings 30% - 50% range
- b. Investment Grade Audits
- c. Competitive Pricing
- d. Turnkey approach.
- e. Customized, Engineered Solutions



Water Rates

- Are you paying the right Rate?
- Are you paying for sewer costs that are not used?
- How old is your water meter? - Is your meter accurate?

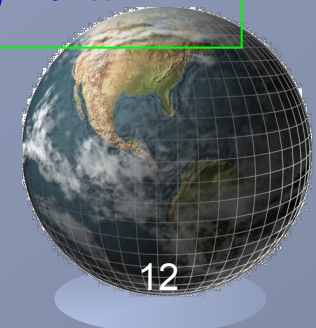


Keeping Water Use in Perspective

What does it cost?

| | <u>Water</u> | <u>Sewer</u> | <u>Combined</u> |
|--|----------------|----------------|-----------------|
| <i>Selected National Water/Sewer Costs per HCF</i> | | | |
| <i>New Haven, CT</i> | <i>\$3.710</i> | <i>\$2.460</i> | <i>\$6.17</i> |
| <i>Providence, RI</i> | <i>\$1.134</i> | <i>\$2.569</i> | <i>\$3.70</i> |
| <i>Boston</i> | <i>\$4.719</i> | <i>\$5.91</i> | <i>\$10.63</i> |
| <i>Philadelphia, PA</i> | <i>\$1.53</i> | <i>\$1.051</i> | <i>\$2.58</i> |
| <i>Jacksonville, FL</i> | <i>\$4.96</i> | <i>\$5.19</i> | <i>\$10.15</i> |
| <i>Los Angeles, CA</i> | <i>\$5.42</i> | <i>\$3.297</i> | <i>\$8.717</i> |
| <i>New York, NY</i> | <i>\$2.61</i> | <i>\$4.15</i> | <i>\$6.76</i> |
| <i>Indianapolis, IN</i> | <i>\$0.907</i> | <i>\$2.766</i> | <i>\$3.67</i> |
| <i>San Francisco, CA</i> | <i>\$3.48</i> | <i>\$8.35</i> | <i>\$11.83</i> |
| <i>Seattle, WA</i> | <i>\$10.62</i> | <i>\$8.89</i> | <i>\$19.51</i> |

Water rates are increasing annually in most locations!



Keeping Water Use in Perspective

What does it cost?

Bottled Water at \$1.35 per gallon

\$121,000 per HCF

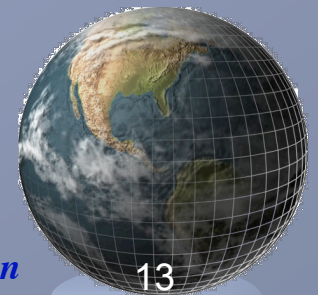
HCF = 120 Hundred Cubic feet or about 90,000 gallons

Are Municipalities Charging Enough for Water
to Motivate Investments in Water Efficiency?

“It struck me...

all you had to do is take the water out of the ground and then sell it
for more than the price of wine, milk or for that matter, oil”

Past Chairman of Perrier

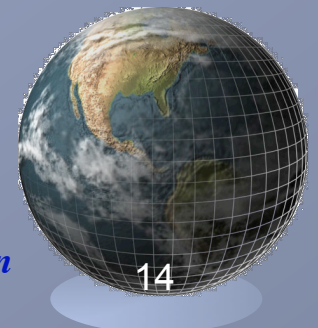


Keeping Water Use in Perspective What does it cost?

And What about the Plastic - Pollution
Waste, Associated Costs and
Health Risks.....

“Where else can you find a business that is totally international
where the price and volumes, unlike steel rarely go down”

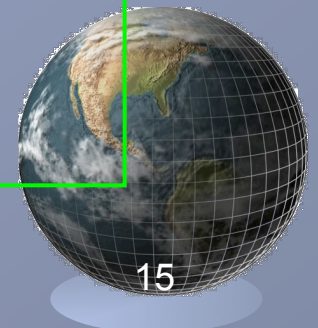
Suez CEO Gerard Mestrallet



Metering

How is Water used

- Meter water use to know where water is used
- Monitor and chart performance
- Target high water use areas for efficiency
- Check for leaks when readings are excessive
- Get credit for water not going to the sewer - COOLING TOWER(s) - (1.) evaporation, (2.) Clean blow-down water, IRRIGATION



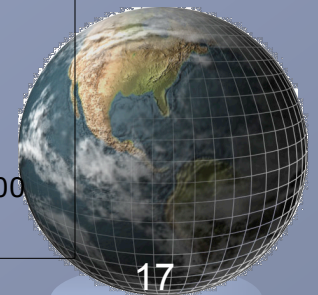
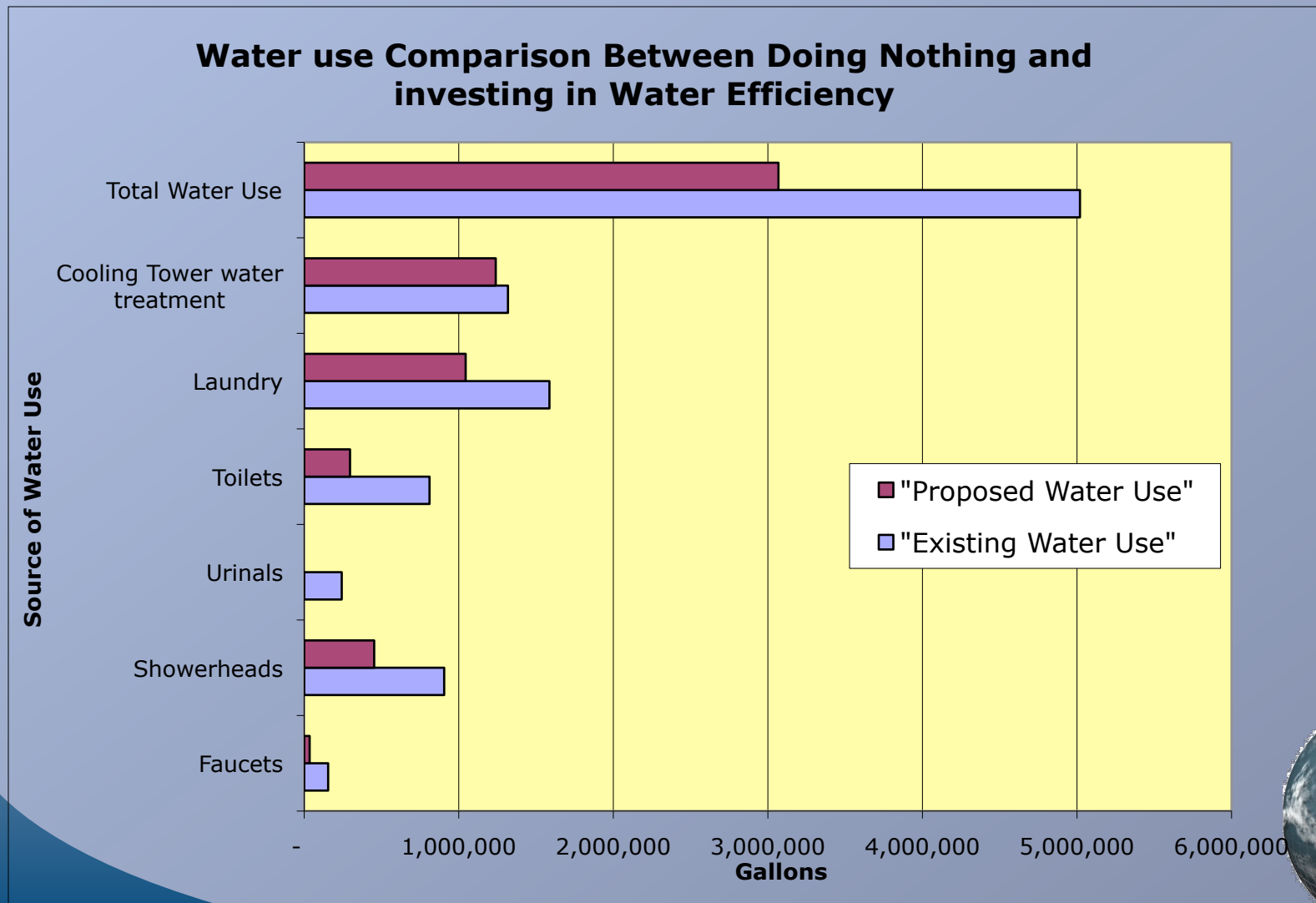
Usage and Billing Data

- *Graph Usage*
- Water/sewer usage
(\$, \$/ccf or 1,000 gallons)
- Energy used for heating hot water
(\$, \$/therm, kW, \$, average \$/kWh)



Metering / Benchmarking

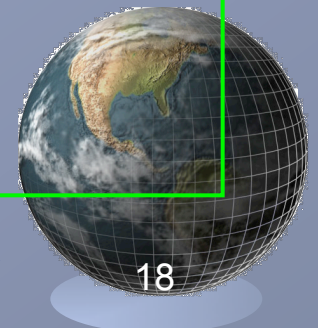
How is Water used?



The Program

Domestic Water Savings - The Basics

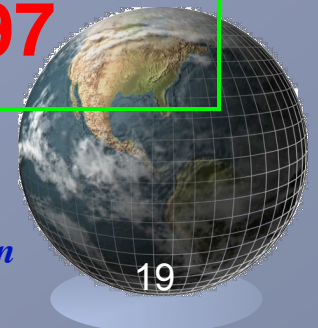
- Investment Grade Audits
- Benchmarking
- Faucet Retrofit or Replacement
- Shower Replacement
- Urinal Upgrades
- Water Closet Replacement (ADA Upgrades)
- Laundry Re-Use Systems / Ozone
- Swimming Pools
- Leak Detection
- Irrigation System Upgrades
- Cooling Towers
- Evaporative Coolers
- Steam Systems
- Once Through Cooling
- Sub-metering
- Water Awareness Programs



Faucets Aerators



- 1/2 gallon per minute
- Replace existing 2.2 gallon per minute aerators
- 200 unit Hotel
- Annual energy savings: \$1,339/yr
- Annual Water/Sewer Savings: \$ 985/yr
- Simple Payback: 1.01 years
- Return on Investment (ROI) 99.3%
- Life Cycle Cost Savings (10 Years): **\$20,897**





1.25 GPM

Showers

Customer acceptable models

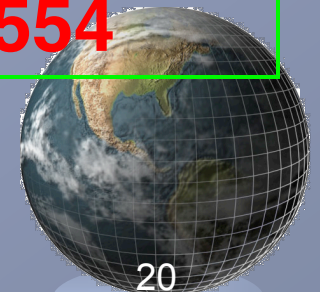


1.25 GPM

- Replace 2.5 gallon per minute showerheads with 1.25 Gallons per minute showerheads
- 200 unit Hotel
- 60% daily shower use
- Annual energy savings: \$4,810
- Annual Water/Sewer Savings: \$3,725/yr
- Simple Payback: 1.15 years
- Return on Investment (ROI): 87.1%
- Life Cycle Cost Savings (10 Years): **\$75,554**

Conservation Solutions Corporation
Water Efficiency Division

1.0 GPM



Toilets / Water Closets

- Convert 3.5 gallon per flush
(GPF) to 1.28 GPF
- 200 Unit Hotel
- Water/Sewer Savings: **\$4,231/yr**
- Simple Payback: **8.6 yrs**
- Return on Investment (ROI): **11.7 %**
- Life Cycle Cost Savings (10 Years): **\$6,009**



- Contemporary, high profile design
- E-Max® Technology
- Powerful, quiet flush every time
- Wide, 2-1/8" computer designed trapway
- Large water surface

High profile close coupled toilet. Low consumption (1.28 Gpf/8 Lpf) siphon jet flushing action.

Tank cover, fittings, chrome plated trip lever, less seat.

■ CST744E
Elongated, 12" rough-in, less seat.

□ C744E
Elongated bowl only, 12" rough-in.

□ ST743E
Drake tank and cover only. Complete with tank trim and coupling components.

□ SS114
SoftClose®. Seat and lid gently close with a touch of a hand. Elongated, closed front seat with lid.

□ SC134
Elongated, open front seat with lid.

□ SC534
Elongated, open front seat less lid.

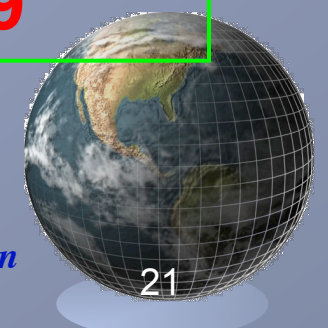
Colors:
Standard #01 Cotton

Trip Lever:
Standard #02 Chrome Plated

CST744E - Eco Drake® Toilet
SS114 - SoftClose® Seat

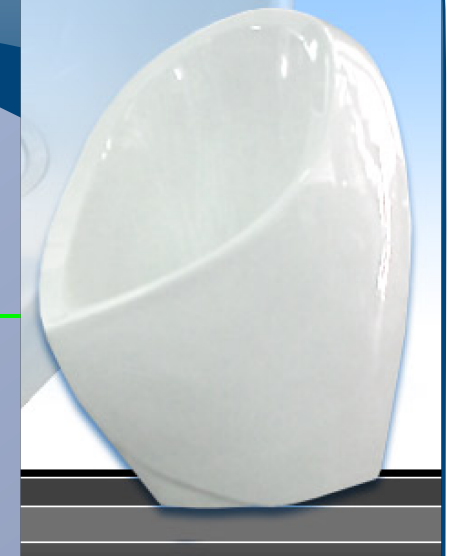


E-Max® Technology: Quiet, powerful, commercial grade flushing performance.
Choose a SoftClose® toilet seat, or upgrade to a Washnet.
Fast Flush™. New, wide 3" flush valve is 125% larger than conventional 2" flush valves.

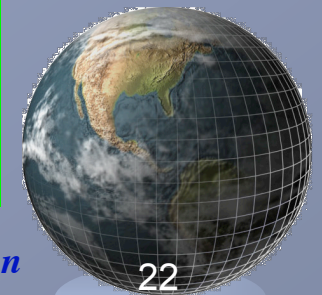


Options for Urinals

ZeroFlush Urinals



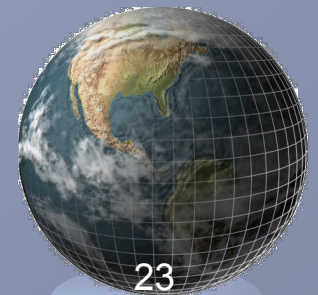
- Technology Evolution
- Earlier Designs used CARTRIDGES which held urine sealant and sediment
- New Design uses a **TRAP SYSTEM** with much large capacity.
- **LARGER TRAP** Means more uses & less maintenance!
(Averages 15,000+ instead of just 3,000 - 7,000)
- Saves equivalent of 3 swimming pools of water per year



Options for Urinals

ZeroFlush Urinals

- Replace 1.5 gallon per flush (GPF) with ZeroFlush Urinal (5 Urinals)
- Urinal Annual Water Savings: \$1,998
- Simple Payback: 2.4 years
- Return on Investment (ROI): 42.1 %
- Life Cycle Cost Savings (10 year): **\$13,126**



Options for Urinals

ENZYMES

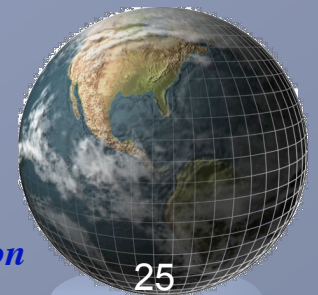
- Shut-Off Water Supply to 1.5 GPF Urinal
- and install Water Saving Urinal Pads (5 urinals)
- Urinal Annual Water Savings: \$ 1,998
- Simple Payback: 0.4 years
- Return on Investment (ROI): 266.3%
- Life Cycle Cost Savings (10 year): **\$12,476**



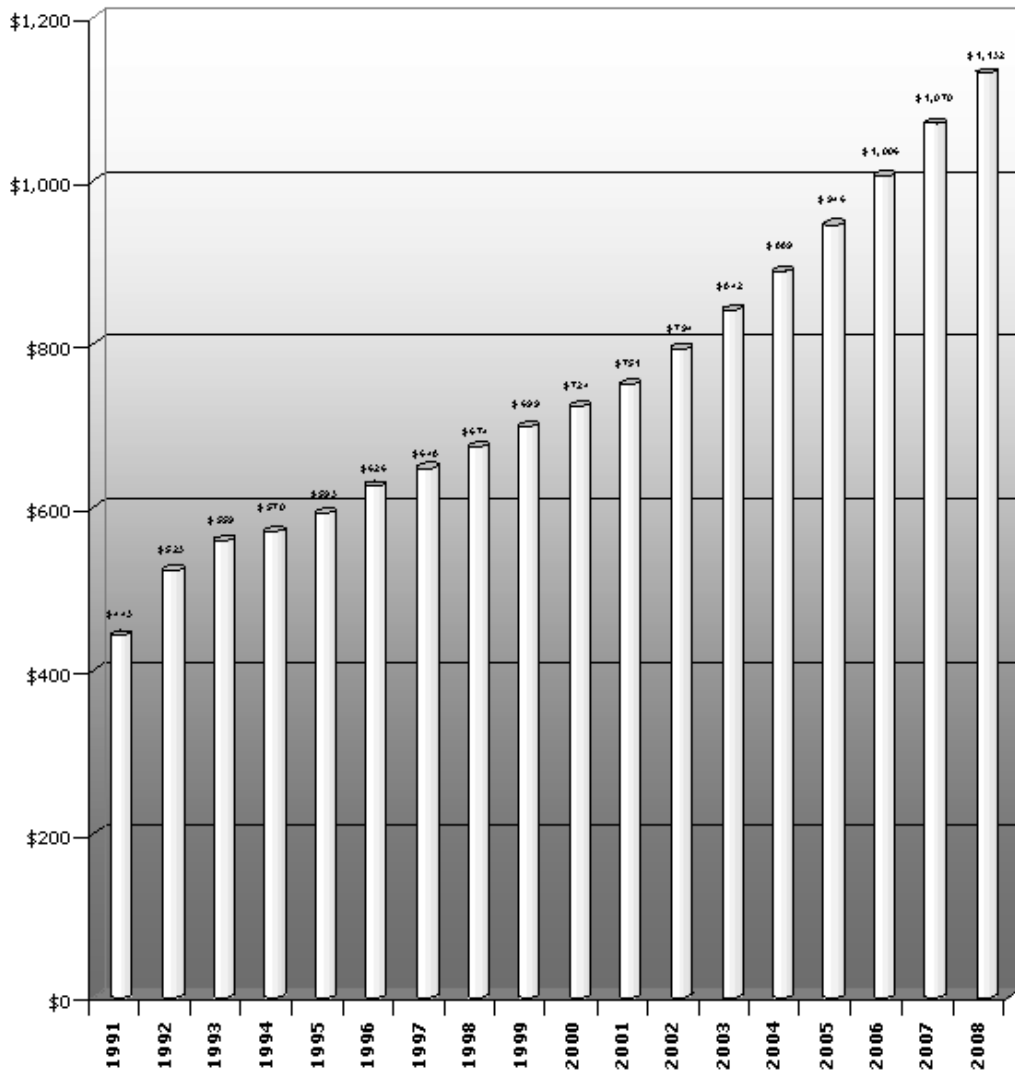
Options for Urinals

1/2 Gallon Per Flush Urinals

- Replace 1.5 gallon per flush with 1/2 GPF flush valves
- Urinal Annual Water Savings: \$ 1,373
- Simple Payback: 1.1 years
- Return on Investment (ROI): 94.7 %
- Life Cycle Cost Savings (10 year): **\$13,733**



Combined Annual Water & Sewer Charges in MWRA Communities 1991 - 2008

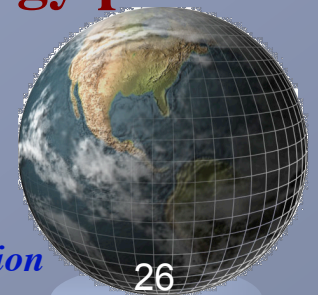


Life Cycle
Cost!!!!

Boston Area Water and Sewer Rates have Gone up 260.1% since 1991 or about 14.45%/yr.

How much will rates go up over the next 18 years?

What about energy prices?



Leaks - Fix Em

| Water Savings - Repair Leaks | | | | Water Loses Due to Leaks | | | |
|------------------------------|--------------------------|---------------------------|---------------------------|--------------------------|--------------------------|----------------------------|---------------------------|
| # of Drips/Minute | Daily Water Loss Gallons | Montly Water Loss Gallons | Annual Water Loss Gallons | Seconds to Fill 8 oz Cup | Daily Water Loss Gallons | Monthly Water Loss Gallons | Yearly Water Loss Gallons |
| 1 | 0.1 | 4.3 | 52.7 | 1 | 5,400.0 | 162,000 | 1,971,000 |
| 2 | 0.3 | 8.7 | 105.3 | 2 | 2,700.0 | 81,000 | 985,500 |
| 3 | 0.4 | 13.0 | 157.9 | 3 | 1,800.0 | 54,000 | 657,000 |
| 4 | 0.6 | 17.3 | 210.4 | 4 | 1,350.0 | 40,500 | 492,750 |
| 5 | 0.7 | 21.6 | 263.0 | 5 | 1,080.0 | 32,400 | 394,200 |
| 6 | 0.9 | 25.9 | 315.5 | 6 | 900.0 | 27,000 | 328,500 |
| 7 | 1.0 | 30.3 | 368.1 | 7 | 771.4 | 23,143 | 281,572 |
| 8 | 1.2 | 34.6 | 420.7 | 8 | 675.0 | 20,250 | 246,375 |
| 9 | 1.3 | 38.9 | 473.2 | 9 | 600.0 | 18,000 | 219,000 |
| 10 | 1.4 | 43.2 | 525.8 | 10 | 540.0 | 16,200 | 197,100 |
| 11 | 1.6 | 47.5 | 578.3 | 11 | 490.9 | 14,727 | 179,182 |
| 12 | 1.7 | 51.9 | 630.9 | 12 | 450.0 | 13,500 | 164,250 |
| 13 | 1.9 | 56.2 | 683.5 | 13 | 415.4 | 12,462 | 151,615 |
| 14 | 2.0 | 60.5 | 736.0 | 14 | 385.7 | 11,571 | 140,786 |
| 15 | 2.2 | 64.8 | 788.6 | 15 | 360.0 | 10,800 | 131,400 |
| 16 | 2.3 | 69.1 | 841.1 | 16 | 337.5 | 10,125 | 123,188 |
| 17 | 2.4 | 73.5 | 893.7 | 17 | 317.6 | 9,529 | 115,941 |
| 18 | 2.6 | 77.8 | 946.3 | 18 | 300.0 | 9,000 | 109,500 |
| 19 | 2.7 | 82.1 | 998.8 | 19 | 284.2 | 8,526 | 103,737 |
| 20 | 2.9 | 86.4 | 1,051.4 | 20 | 270.0 | 8,100 | 98,550 |
| 21 | 3.0 | 90.7 | 1,103.9 | 21 | 257.1 | 7,714 | 93,857 |
| 22 | 3.2 | 95.1 | 1,156.5 | 22 | 245.5 | 7,364 | 89,591 |
| 23 | 3.3 | 99.4 | 1,209.1 | 23 | 234.8 | 7,043 | 85,696 |
| 24 | 3.5 | 103.7 | 1,261.6 | 24 | 225.0 | 6,750 | 82,125 |
| 25 | 3.6 | 108.0 | 1,314.2 | 25 | 216.0 | 6,480 | 78,840 |
| 26 | 3.7 | 112.3 | 1,366.7 | 26 | 207.7 | 6,231 | 75,808 |
| 27 | 3.9 | 116.7 | 1,419.3 | 27 | 200.0 | 6,000 | 73,000 |
| 28 | 4.0 | 121.0 | 1,471.9 | 28 | 192.9 | 5,786 | 70,393 |
| 29 | 4.2 | 125.3 | 1,524.4 | 29 | 186.2 | 5,586 | 67,966 |
| 30 | 4.3 | 129.6 | 1,577.0 | 30 | 180.0 | 5,400 | 65,700 |

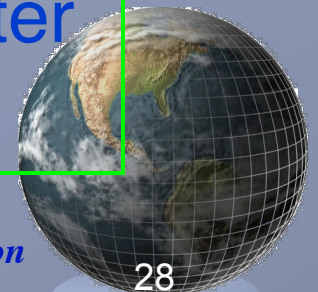


Kitchen

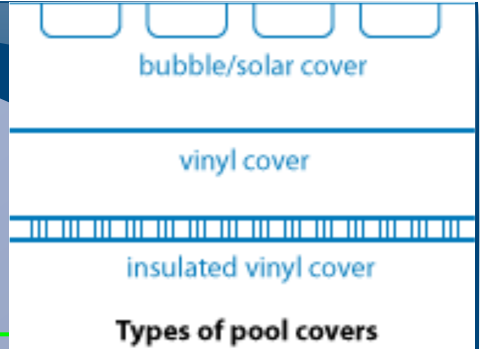


0.5975 GPM

- Pan Washer
- Dishwashers Equipment
- Always wash dishes with full load
- Wash vegetables in Tub not under running water
- Don't thaw food under running water - thaw in walk-in refrigerator - refrigerator works less and saves energy
- Lots more habit changes that can save water and energy



Estimated Swimming Pool Gas Heating Costs and Savings



- Pool Covers - reduce water loss from evaporation & saves energy

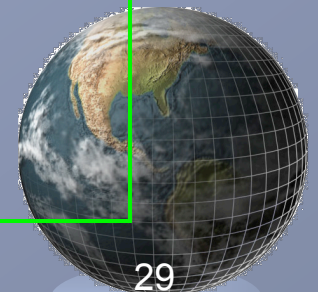
Cost of Outdoor Pool Gas Heating by Location

| Location | Season | Temperature | | |
|---------------|------------|-------------|----------|----------|
| | | 78° | 80° | 82° |
| Boston | | | | |
| No Cover | 5/1 - 8/31 | \$ 1,712 | \$ 2,096 | \$ 2,504 |
| With Cover | 5/1 - 8/31 | \$ 232 | \$ 328 | \$ 461 |



The table above estimates annual costs by location, by water temperature, and with or without a pool cover

U. S. Department of Energy - Energy Efficiency and Renewable Energy
 A Consumers Guide to Energy Efficiency and Renewable Energy
 Here you will find information to help estimate gas heating costs for an outdoor swimming pool and/or savings if you replace a gas pool heater with one that's more efficient



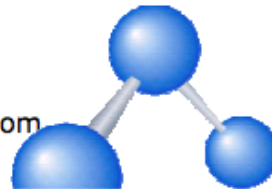
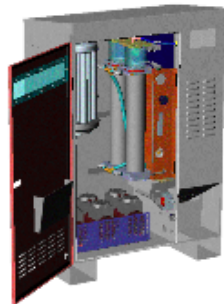
 **Conservation Solutions Corporation**
The Energy & Water Conservation Professionals

162 Great Road, Acton, MA 01720
Tel. 978-266-1900 FAX 978-266-1976
www.ConservationSolutions.com

LAUNDRY OZONE BENEFITS

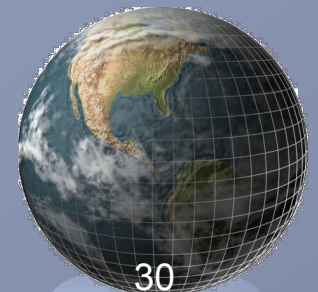
 **OZONE SOLUTIONS**
LAUNDRY OZONE PURIFICATION SYSTEMS

- 25 to 50% reduction in total water usage
- 90 to 98% reduction in hot-water usage
- Reduced linen replacement budget
- Reduction in man-hours
- Ozone reduces maintenance, protects equipment
- Linens are whiter, softer and smell better
- Reduction in dryer time, temperature, and lint
- Ozone destroys bacteria and inactivates viruses and cysts
- More effective against microorganisms (200~3000 times)
- Strongest oxidizer next to elemental Fluorine
- Ozone enhances chemical reaction in the wash wheel for superior cleaning
- Conserves natural gas and water.
- Improved working environment in the laundry room



Laundry Ozone Systems

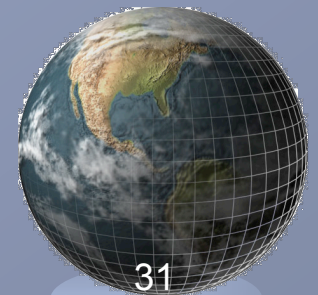
- Omni Hotels
- Langdam Hotel
and many more



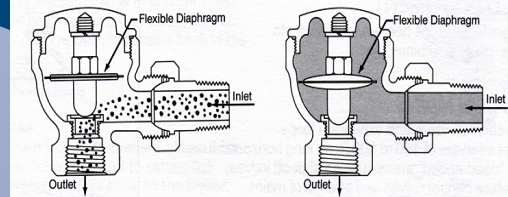
Laundry Ozone Systems

- 90% reduction in hot water costs
- 25% - 30% reduction in water & sewer costs
- Reduced chemical use

| | |
|--------------------------------------|------------------|
| • Project Cost: | \$39,930 |
| • Annual Savings: | \$49,790 |
| • Simple Payback: | 0.78 years |
| • Return on Investment (ROI): | 127.9 % |
| • Life Cycle Cost Savings (10 year): | \$412,976 |



Water Loss in Steam Systems



- Steam Trap Repair & Trap Selection (*life time warranty*)
- Quenching condensate
- Leak Repair
- Control Valves
- Repair Receivers
- Piping



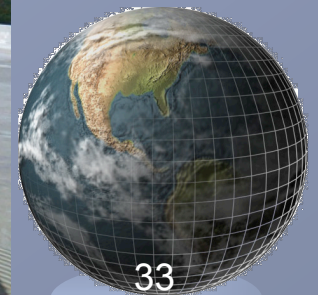
Conservation Solutions Corporation
Water Efficiency Division

Heating Water Efficiently

- INSULATE HOT WATER PIPES!
- Pre-heat domestic hot water
- Heat Recovery from Refrigeration / Cooling Systems
- Solar Water Heating (MTC & Utility \$)
- Cogeneration



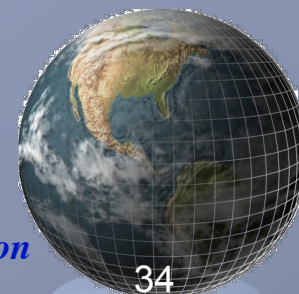
Conservation Solutions Corporation
Water Efficiency Division



Recognize This?



Conservation Solutions Corporation
Water Efficiency Division



Consider this:

**500 Ton cooling tower
operating at 50% capacity 210 days / year**

2,500,000 gallons as vapor

Make-up water

3,250,000 gallons

1500 pounds
Chlorine

81 gallons Biocide

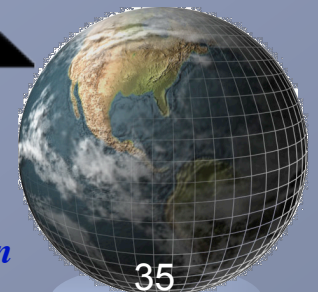
1500 lbs. sediment



Fills 10 houses (1250
sq/ft each) full per year



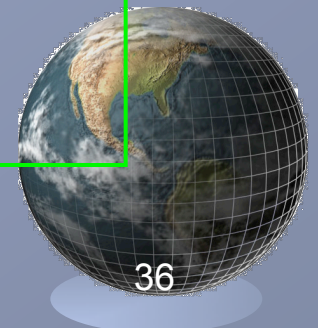
756,000 gallons contaminated
water discharge



CHEMICAL-FREE Water Treatment

Cooling Towers, Chillers, Heat Exchangers

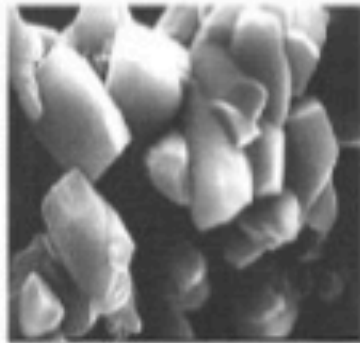
- **Cooling Towers, Chillers, Heat Exchangers**
- Eliminate Chemical Use & Costs
- Save Water
- Significantly Reduce Environmental Footprint
- Save Energy - (eliminate scale & biofilm)
- Guaranteed bacteria control
- Re-use Blow-Down Water
- LEED Points



How Does It Work?



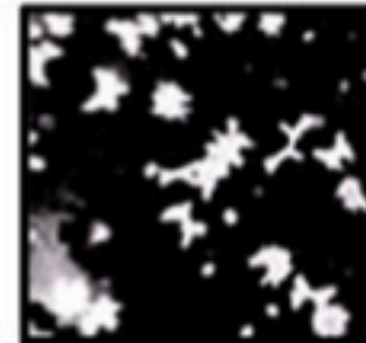
"Electronically Induced Catalysis"TM (EICTM)



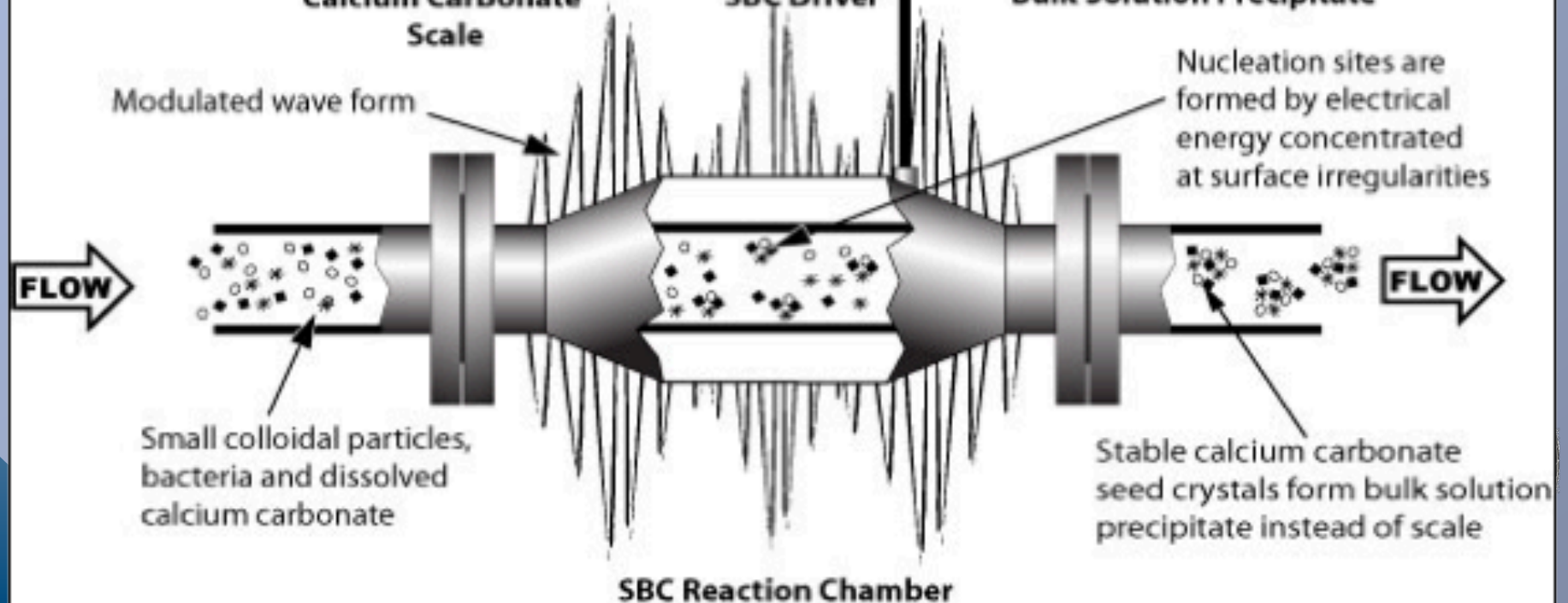
Calcium Carbonate Scale



SBC Driver



Bulk Solution Precipitate



Modulated wave form

Nucleation sites are formed by electrical energy concentrated at surface irregularities

FLOW

Small colloidal particles, bacteria and dissolved calcium carbonate

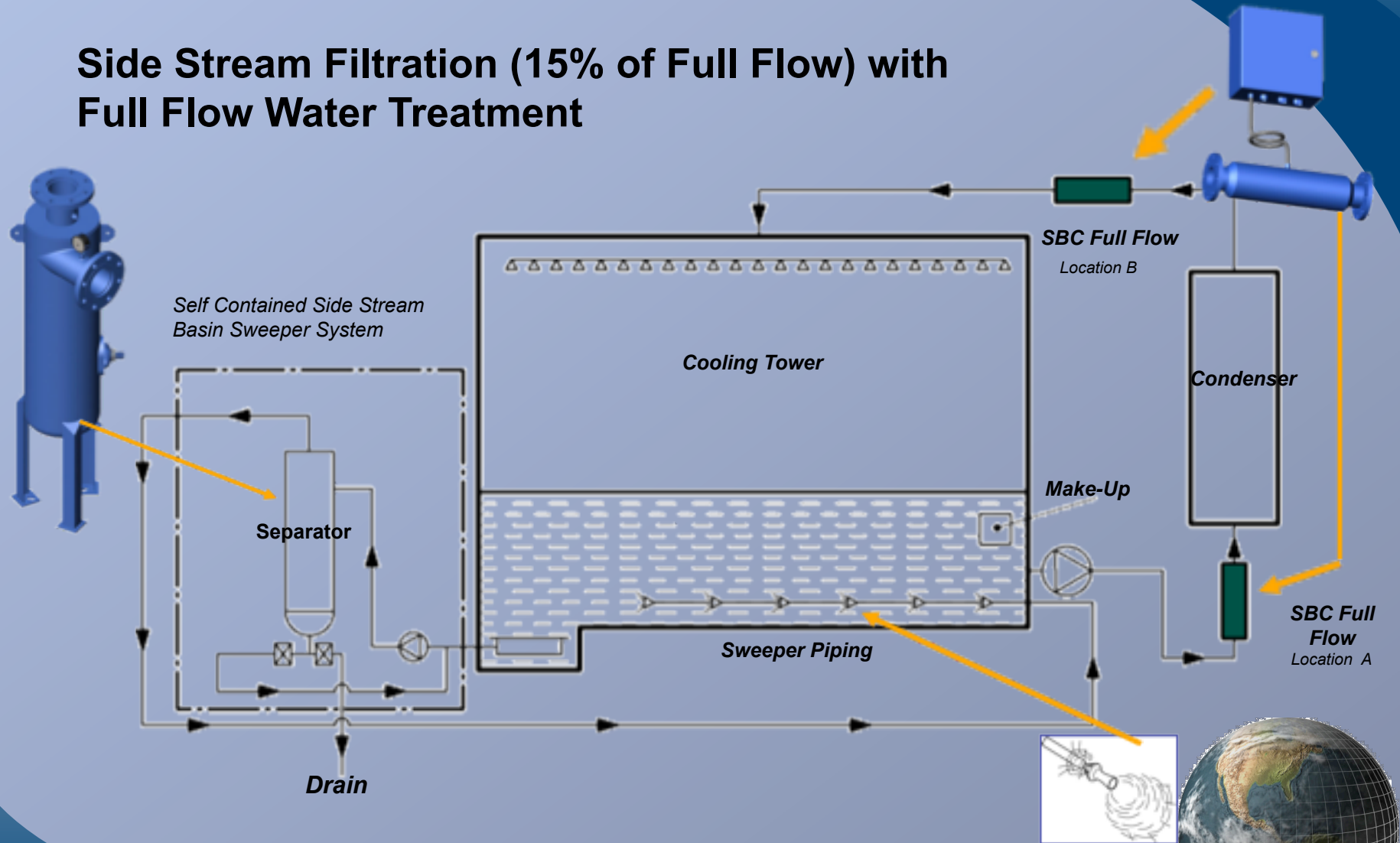
Stable calcium carbonate seed crystals form bulk solution precipitate instead of scale

SBC Reaction Chamber

FLOW

Water Treatment System Design

Side Stream Filtration (15% of Full Flow) with Full Flow Water Treatment





Conservation Solutions Corporation
The Energy & Water Conservation Professionals

CASE STUDY

**Water Treatment:
Cooling Towers**

THE PROBLEM:

The Museum of Science Boston was upgrading part of their system by installing a new cooling tower and new chiller and wanted to have more consistent control of the biological activity, corrosion and scale on all their cooling systems. The Museum was also interested in "Green Building" design and reducing hazardous chemical as well as being a "good neighbor".



**Museum of Science, Boston
Boston, MA**

THE SOLUTION:

Three (3) **Griswold SBC Chemical-Free Electronic Resonance Water Treatment Systems** were installed on the new and existing Cooling Towers and Chillers at the Museum of Science Boston. The biological counts are expected to be consistently less than 10,000 CFU/ml as guaranteed, corrosion is controlled and the water in the cooling tower is crystal clear all accomplished without chemicals except for passivation of the new cooling tower. No calcite scale is expected to form in the condenser loop, which will optimize energy efficiency in the cooling system. There is less water used because blow-down of the cooling tower occurs less frequently since the cooling system operates at a higher conductivity level than if the cooling tower was chemically treated.

The Museum of Science staff members are pleased with the significant reduction in chemical use and are particularly pleased about not having to handle hazardous chemicals and lug them up to the penthouse mechanical rooms.

THE RESULTS

1. Eliminated Use & Cost of Hazardous Chemicals
2. Reduced Annual Water Usage
3. Reduced Energy Costs
4. Improved Environment
5. Reduced Total Operating Cost of Cooling System

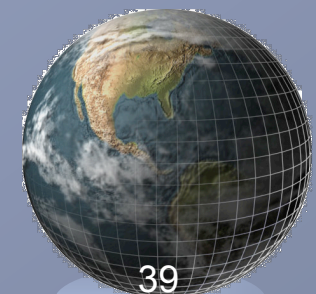
162 Great Road, Acton, Massachusetts 01720
Phone: 978.266.1900 Fax: 978.266.1976
e-mail: dcook@conservationsolutions.com
www.conservationsolutions.com

**Griswold SBC10000
Reaction Chamber
& Control Panel**



- Museum of Science in Boston

Going Green



Conservation Solutions Corporation Water Management - Financial Analysis

Location of Installation: **New Haven, CT Hotel Application
300 Ton Cooling Tower & Chiller**

Application: One (1) 300 Ton Cooling Tower

Simplified Cost Analysis for Cooling Towers with the Griswold SBC Water Treatment System

| Cost per Year | Chemical | Griswold SBC | Savings |
|---|-----------------|---------------------|----------------|
| Estimated Water | \$2,616 | \$2,223 | \$392 |
| Estimated Sewer Disposal | \$1,734 | \$1,474 | \$260 |
| Electrical Costs | \$115 | \$83 | \$32 |
| Estimated Maintenance | \$1,750 | \$1,050 | \$700 |
| Estimated Chemicals | \$2,700 | | \$2,700 |
| Energy Savings based upon a 5% improvement in chiller and tower efficiency due to the elimination of biofilm & calcite scale. * | 74,164 | \$70,456 | \$3,708 |

* **Note:** Energy use is estimated. Actual energy use may be higher at the Hotel resulting in higher energy savings.

Total **\$83,080** **\$75,286** **\$7,793**

Annual Savings With Griswold SBC System **\$7,793**

Total Investment **\$22,290**

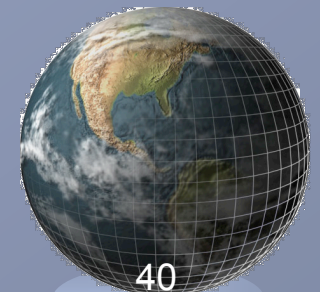
Payback (years) **2.86**

Return on Investment (ROI) **35.0%**

Life Cycle Cost Comparison (10 years)

- Griswold Chemical-Free Water Treatment System **\$ 51,828**
- Chemical Treatment **\$ 91,044**
- Savings over 10 Years **\$ 39,216**

**Energy, Water, Sewer
and Chemical Savings
from Griswold Water
Systems SBC
Chemical-Free Water
Treatment System**



Pollution Reduction from Installation of a Chemical-Free Water Treatment System In a Hotel

| | |
|--------------------------|---------------------------------|
| Cooling Tower Size: | 300 Tons |
| Evaporation: | 1,206,252 gallons per yr. (GPY) |
| Blow-down: | |
| Chemical Treatment: | 402,082 GPY |
| Griswold SBC: | 201,042 GPY |
| Savings: | 201,042 GPY |
| Chlorine Reduction: | 473 lbs/yr |
| Isothiazoline Reduction: | 3.25 GPY |



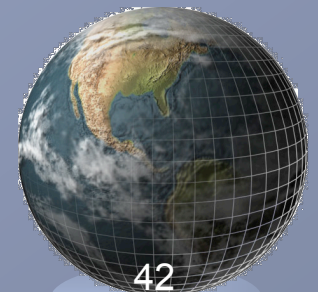
Cooling Towers are a Significant Pollution Reduction Opportunity

Did you Know?

Approximately 3,200 gallons of chlorine and bromine are released into the atmosphere for every 2500 tons of cooling and approximately 4.3 million gallons of chemical laden blow-down water is dumped into our local water treatment plants

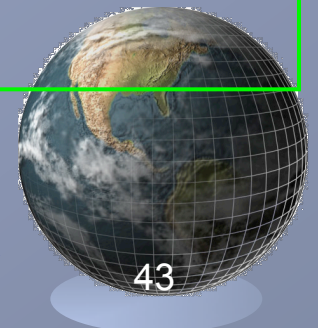
**Be a Good
Neighbor**

How many cooling towers
are in your neighborhood?



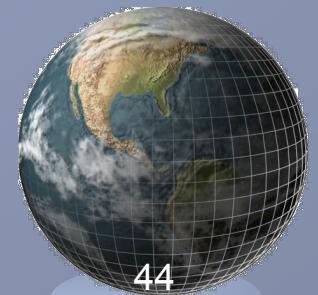
Irrigation

- Use satellite based irrigation systems to prevent over watering save as much as 50%
- Don't water when it is raining
- Use secondary water sources
- Cooling Tower Blow-down
- Rain water recovery systems
- Greywater systems



Rain Water Recovery Systems

- **Collection Systems**
- Add other Sources of Water
- Clean Cooling tower blow-down water
- Condensate from air handlers
- RO Re-Gen



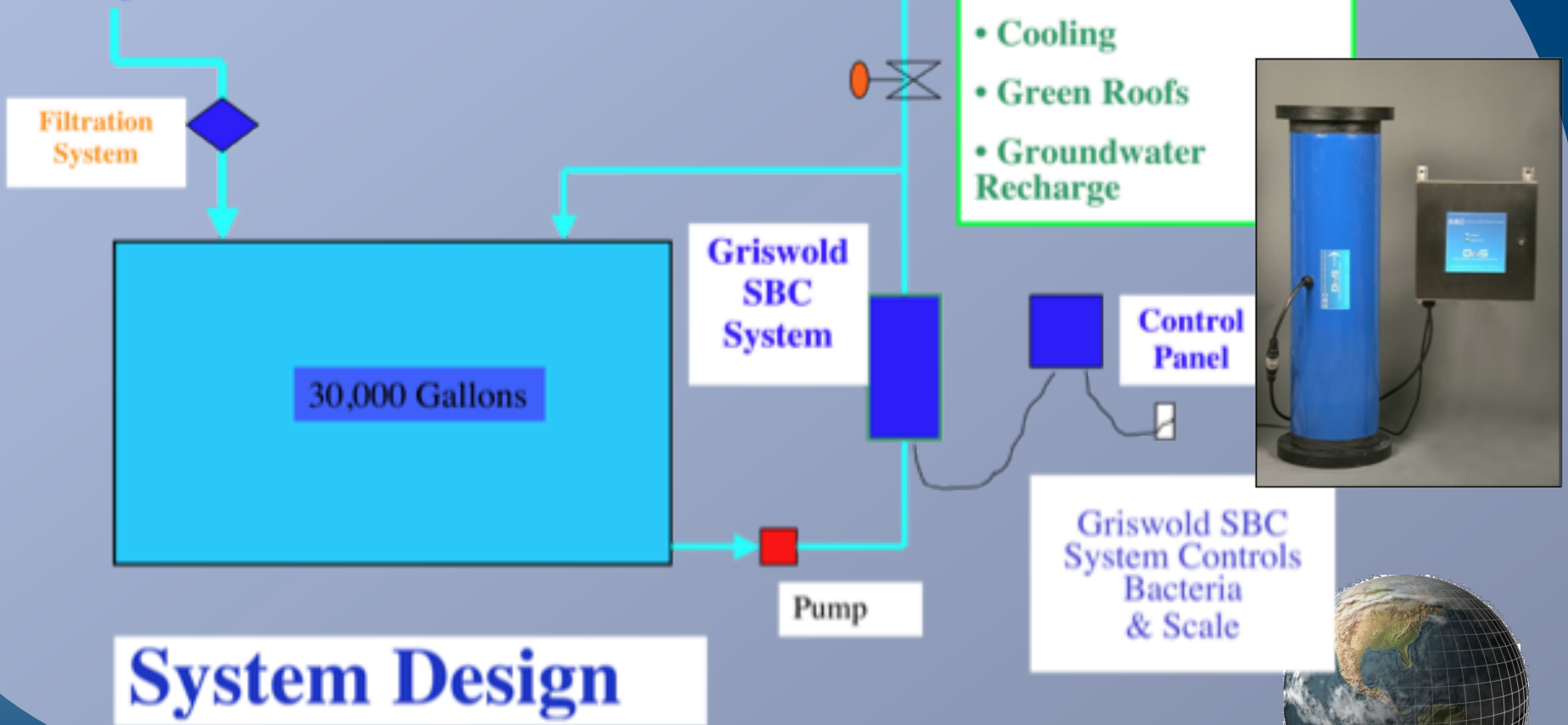
Water Re-Use

Water Sources

- Griswold SBC Chemical-Free Cooling Tower Blow-down
- Rainwater
- Air Handler Condenser Water
- RO Re-gen

Applications

- Irrigation
- Decorative Fountains
- Fire Retention Ponds
- Toilets/Urinals
- Cooling
- Green Roofs
- Groundwater Recharge



System Design

CASE STUDY

Water Treatment: Cooling Towers **Rainwater Recovery for cooling tower make-up water**

THE PROBLEMS

Pandora Mills is a 144,000 square-foot mill renovation project by the Merrimack River in Manchester New Hampshire. The owner wanted to make their building “green”. Part of this initiative includes reducing energy and water use as well as eliminating or reducing chemical use. The goal is to also reduce operating costs.



Pandora Mills
Manchester, NH

THE SOLUTIONS

A rainwater recovery system was installed to provide make-up water to the cooling tower instead of using drinking water. The **Griswold SBC Chemical-Free Water Treatment Systems** was installed on the rainwater recovery system to control bacteria and biofilm. Another **Griswold SBC Chemical-Free Water Treatment Systems** was installed on the new cooling system. This system completely eliminates chemical use for the water treatment system at Pandora Mills and significantly reduces water use by the cooling system. The biological counts are less than 5,000 CFU/ml, corrosion is controlled and the water in the cooling tower is crystal clear all accomplished without any chemicals. Pandora Mills has invested in a “greener” building with tremendous financial gains that come with this including reduction in water use, increased energy efficiency due to less fouling while at the same time receiving a guaranteed biological control in the cooling towers.

THE GREEN RESULTS

- Eliminated Use & Cost of Hazardous Chemicals
- Significantly Reduced make-up Water Requirement
- Reduced Energy Costs
- Improved Working Environment for Staff by Eliminating the Need to Handle Chemicals

162 Great Road, Acton, Massachusetts 01720

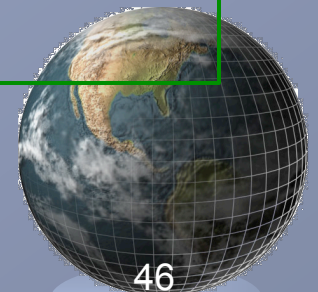
Phone: 978.266.1900 Fax: 978.266.1976

E-Mail: dcook@conservationsolutions.com www.conservationsolutions.com



Rainwater Recovery Tanks

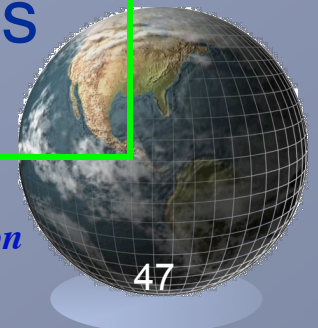
Rainwater used for the Cooling Tower make-up water saves fresh drinking water. No chemicals in the cooling system of this “Green” Building reduces pollution so the building is a better neighbor



Water Awareness



- Understand your water usage
- Establish an Water & Energy Awareness Program - shows management commitment
- Look for changes - They're out there
- Keep up on maintenance
- Set Goals - Reduce average gallons of water payback projects usage by X % (compared to last year)
- Use Internal newsletter to highlight progress towards water and energy reduction goals



Water Conservation Opportunities

- **Sample Hotel Project**

- **Products Installed :**

Toilets (1.28 GPF), faucet aerators, Zero Flush Urinals, Showerheads (1.5 GPM), Ozone, Cooling Water Treatment

- Gallons Saved per year: 1,950,767

- Project Cost: \$104,217

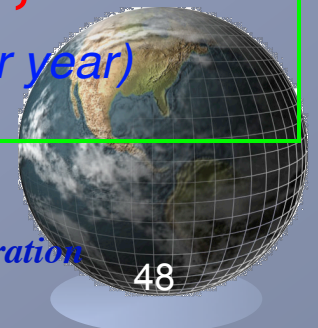
- Annual Water and Energy Savings: \$68,460

- Simple Payback: 1.52 years

- Return on Investment (ROI): 65.7%

- Life Cycle Cost Savings (10 years): **\$684,605**

(Assumes Average 0% increase in energy water & sewer costs per year)

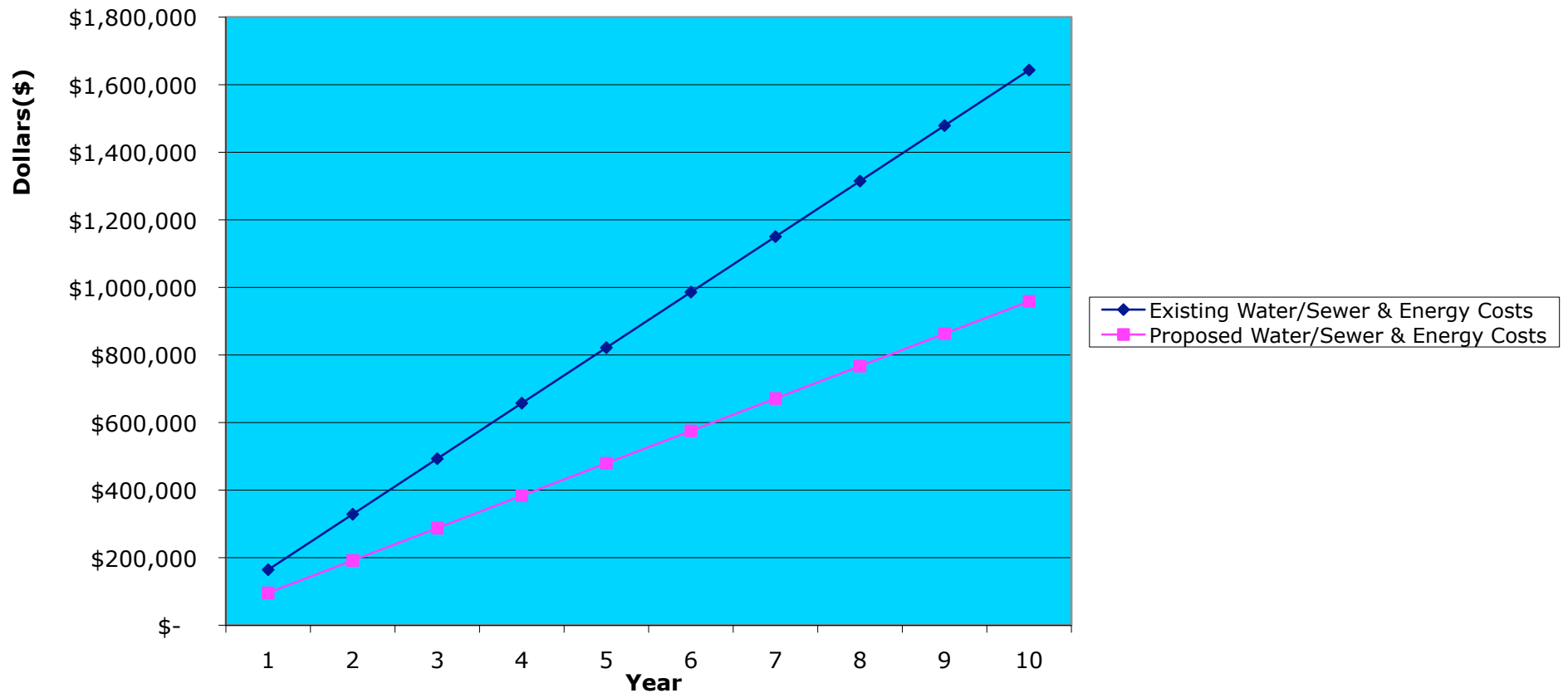


Ten Year Life Cycle Cost Savings

Assumes 0% Increase in Energy & Water/Sewer Costs per Year

\$684,605 Savings

10 Year Life Cycle Cost Comparison Between Doing Nothing and Investing in Energy and Water Efficiency

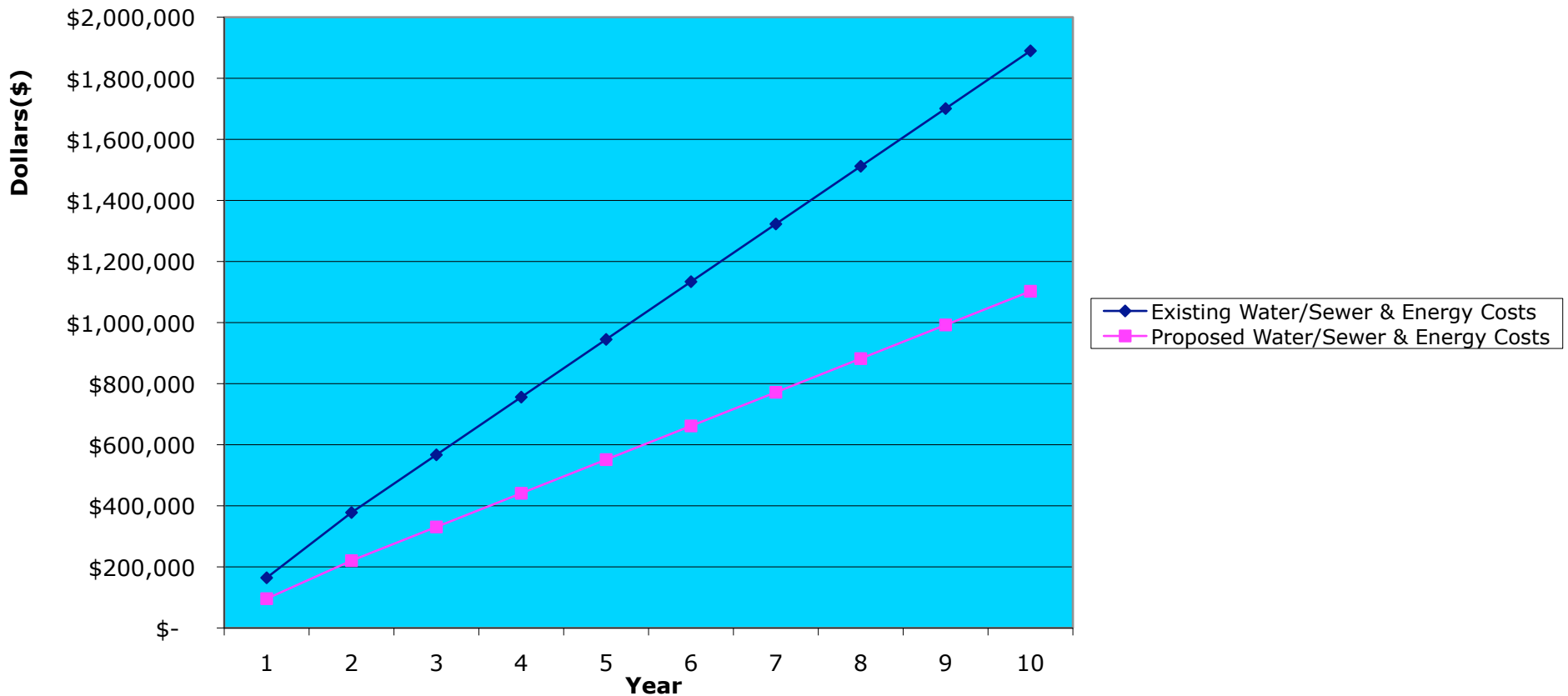


Ten Year Life Cycle Cost Savings

Assumes Annual **15%** Increase in Energy & Water/Sewer Costs

\$787,296 Savings

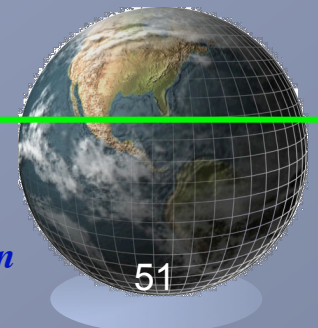
10 Year Life Cycle Cost Comparison Between Doing Nothing and Investing in Energy and Water Efficiency



The Positive Effects of Water

- According to a University of Washington study, 75% of Americans are chronically dehydrated.
- For 37% of Americans, the thirst mechanism is so weak that it is often mistaken for hunger. MILD dehydration will slow down one's metabolism as much as 3%.
- One glass of water shuts down midnight hunger pangs for almost 100% of the dieters studied.
- The lack of water is the number one trigger for daytime fatigue.
- Preliminary research indicates that 8-10 glasses of water per day could significantly ease back and joint pain for up to 80% of sufferers.
- A mere 2% drop in body water can trigger fuzzy short-term memory, trouble with basic math, and difficulty focusing on the computer screen or on a printed page.

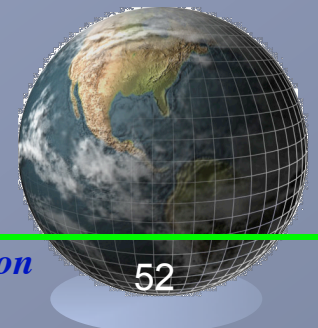
• *Source: University of Washington - 2007*



Why Water Conservation Makes a Difference

The Big Picture

- We can't live without it
- **Protects Drinking Water**
- Ensure Habitats for Animals, Plants and Ecosystems are Maintained
- Reduce pollution: less water means less hot water heating (less energy used means less fossil fuels burned and fewer green house gases)
- We drink it, are mesmerized by it, play in it and entranced by its forms
- **Obligated to meet the water needs of our kids, grandkids and future generations.**



Thank You For Your Time



Conservation Solutions Corporation
Water Efficiency Division

978) 266-1900, ext #14

Dan's Direct (508) 878-9005

dcook.ConservationSolutions.com

www.ConservationSolutions.com

